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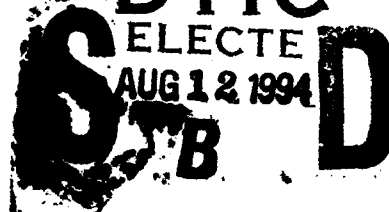## Monterey, California

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THESIS

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AN EXPERIMENTAL INVESTIGATION OF TIME DELAYS IN SOFTWARE PROJECT STAFFING

by

Michael John Bosley

June, 1994

Thesis Advisor: Tarek Abdel-Hamid

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An Experimental Investigation of Time Delays in Software project Staffing

by

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Submitted in partial fulfillment
of the requirements for the degree of

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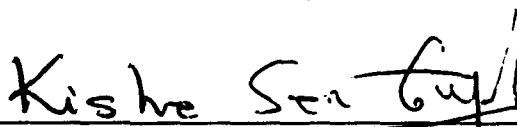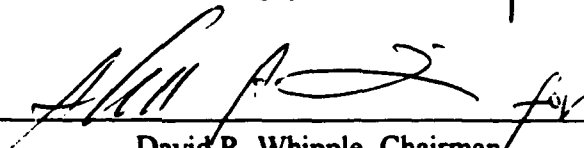
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ABSTRACT

Failing software development projects are plaguing the Department of Defense and other Federal service agencies today. Compounding this fact, the complexity of today's software projects makes it extremely difficult to isolate the underlying problem areas. The System Dynamic Model (SDM), a quantitative tool that simulates software development life cycles, enables us to investigate these problem areas as well as many other pertinent areas. It allows the isolation and manipulation of management variables allowing analysis which in turn leads to a better understanding of the effects variables have on projects. This thereby presents an opportunity to suggest solutions.

This thesis uses this System Dynamic Model's gaming interface to investigate the effects of time delays on software project management. Specifically, this experiment focuses on how software project managers compensate for assimilation and hiring delays inherent to a single project environment. The effect of these delays are measured in terms of staffing level decisions, final cost, and project completion.

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I. INTRODUCTION

A.   BACKGROUND

Within the Department of Defense (DOD), as well as many other Federal service agencies, a critical problem exists concerning software development and management. Software projects that are over budget and behind schedule are commonplace and it seems conceivable that this trend will continue if we do not determine the causes and strive to resolve them. Managers of these projects are continuously blamed for the failure, but seldom given direction to correct the situation.

Two of the most crucial project components the project manager is concerned with are people and money. The various idiosyncrasies of people and the constant flux in project budgets cause difficult problems for the manager who always needs more people than his money can buy.

What then can we do to help these managers come to grips with this problem? One focus is to break apart the various decision areas the manager is involved with and analyze the various options. Through this evaluation, perhaps we might isolate and better understand each area and provide managers with the proper direction they should follow or at least clear up the gray areas to clarify their role.

A comprehensive simulation model that addresses the dynamics of software development has been developed at the Naval Postgraduate School [Ref. 1] and provides a platform for experimentation.   This Systems Dynamics Model (SDM) allows the manipulation of one or several factors while holding others constant so we may study the

decision making process in segments. Through the simulation of software project management scenarios, we are able to isolate several decision processes concerning scheduling, staffing and productivity. These results then can be analyzed to see what impact the decisions had on the project.

One area of research to be studied is that of staffing decisions. Project managers are continuously faced with difficult manning decisions that seriously affect the project's schedule and budget. Within this staffing area, managers are faced with delays in hiring and assimilating personnel into the project and often make the decision to hire late in the life cycle to bring the project to a successful completion. The problem of such late hiring has been stated clearly in *Brooks Law*: "Adding people to a late project makes it later" [Ref. 1].

Through the analysis of various management scenarios we can focus on what information managers use to make different staffing decisions. By comparing projects with different time delay periods we can better understand where the decision process concerning late staffing gets derailed.

B.   PURPOSE OF RESEARCH

The purpose of this thesis is to design, develop, and then execute an experiment using a single project management environment using the Systems Dynamic Model (SDM) gaming interface. The objective of the experiment is to examine the effects of assimilation and hiring delays on managerial staffing decisions. Even though research has been conducted into the affects of delays on decision making [Ref. 2] , no study on the effects

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of delays on staffing software projects using this type of tool has been performed and analyzed.

C. SCOPE OF RESEARCH

The scope of this research is the design, construction, and execution of the systems dynamic model/gaming interface using a single project environment that has been specifically designed to isolate the staffing variable. A group of experimental subjects was divided into four groups (A-D) working on the exact same simulated project. The only differences among the groups were varying assimilation and hiring delay time periods that was described in the documentation provided to each group. Great care was taken to insure that each of the four tested groups were administered the exact same project to manage, and to insure that each participant had no idea of what the other participants were working on.

D. LIMITATIONS

The participants studied for this experiment were graduate students in their fifth quarter of an eight quarter preparation, graduate and subspecialty education program leading to a MS degree in Information Technology Management at the Naval Postgraduate School in Monterey, California. Although these students were not in fact software project managers, the amount of education in software project management and related subjects provided thus far in their curriculum, coupled with general management experience in their careers, suggests that they are appropriate surrogates for real life software managers. This

is further supported by findings of Williams Remus in his research of using graduate students for experimental studies [Ref. 3].

E.   THESIS ORGANIZATION

Chapter II   is an in-depth description of the experiment's organization, its methodology, and experimental group.   Chapter III   describes the various software files and the design of the documentation, as well as the construction considerations taken into account during the creation of the experiment.   The chapter also covers the trial experiment and outcomes. Chapter IV analyzes the results and validates the findings.   Chapter V is a summery of the prominent accomplishments and findings presented in chapters II-IV as well as suggestions for further research.

II.   PREPARATION OF GAME INTERFACE

A.   EXPERIMENTAL DESIGN

Just like a flight simulator aids a pilot in simulating flight environments, the Systems Dynamic Model (SDM) aids in simulating the life of a real software project for software project managers.   The model simulates a software development project environment beginning with the "Design" phase and ending with the completion of the "Testing" phase.

For this experiment, a single research question was isolated for examination: Do software project managers compensate for hiring delays and/or assimilation delays in their staffing decisions?   The experiment focuses on how managers handle the hiring and assimilation delays inherent to their particular projects, and how the decisions they make concerning these delays are reflected in their staffing decisions.

In the experiment, participants assume the role of software project managers. They are tasked to use information, gleaned from reports generated by the model every two calendar months (forty working days), in conjunction with their knowledge of the hiring and assimilation delays inherent to their project, to update the project's staffing level. They can either: 1) increase the staff level, essentially hiring personnel; or 2) decrease the staff level, essentially firing personnel; or 3) do neither by maintaining their current staff level.   The overall goal for each manager is to complete the project on schedule and within budget.   A sample report is illustrated in Figure 2-1.

```
CURRENT INTERVAL STATISTICS:    Elapsed Time =   40

   INITIAL ESTIMATES:  (These will not change throughout the project)
   Project Size                                397   Tasks
   Project Cost                              1,111   Person-Days
   Project Duration                            320   Days

   REPORTED STATISTICS at Time = = = = = =>     40 Days
   Updated Estimate of Total Project Size        0   Tasks
   % Development Reported Complete              45   Percent
   Total Person Days Expended to-date          684   Person Days
   New Est of Project Duration (start-end)     285   Days
   Time Remaining                              280   Days
   Current Staff Size                         5.00   People
   Percent of Workforce that is Experienced     70   Percent

   PRESS <ENTER> TO VIEW THE GRAPHICALLY DISPLAYED VARIABLES
```

Figure 2-1 Sample report, generated every 40 working days

To compare the varying managerial decisions, each participant was assigned randomly to one of four groups (A-D). Each group was in turn assigned different assimilation and hiring delays. Figure 2-2 illustrates these delays.
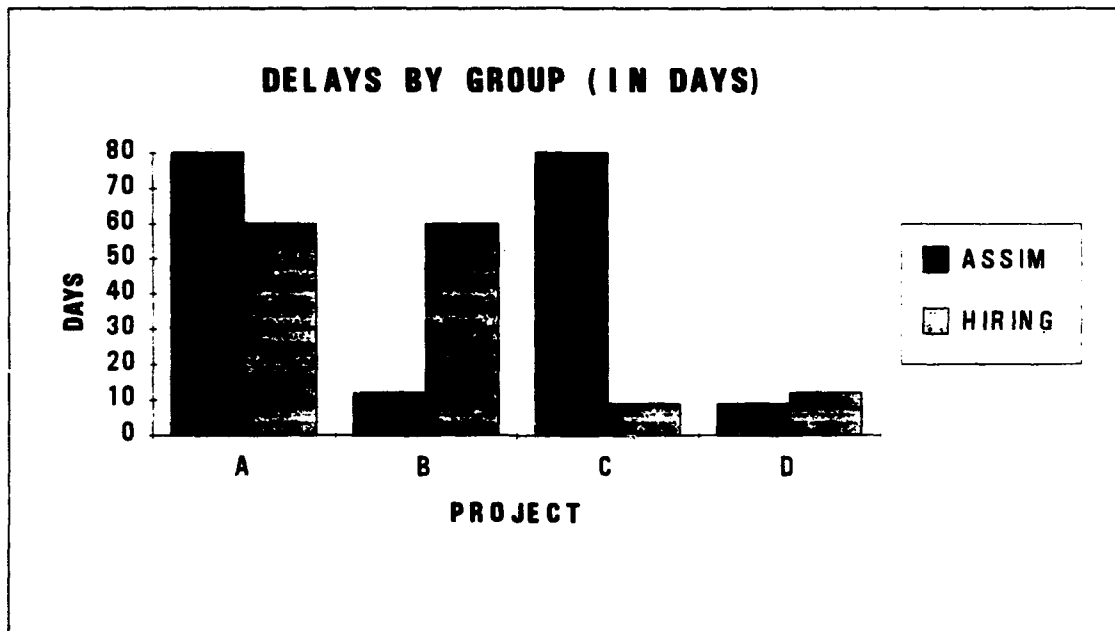
Figure 2-2 Assimilation and Hiring delay differences by Group

The actual names assigned for this experiment were: Projecta, Projectb, Projectc, and Projectd. As illustrated in figure 2-2, Group A was assigned maximum assimilation and hiring delays (80 days for assimilation, 60 days for hiring), group B maximum assimilation delay only (80 days for assimilation, 12 days for hiring), group C maximum hiring delays only (9 days for assimilation, 60 days for hiring), and Group D minimal hiring and assimilation delays (9 days for assimilation, 12 days for hiring).

Throughout this chapter, the symbol ? will be used to identify generic file reference to the four projects, (i.e. Project?.BAT). This experiment was created using data collected from a real NASA project. This is advantageous in that it allows for measurement and comparison against a known baseline.

Each participant was provided a folder with documentation pertaining to his/her randomly assigned group and a disk containing the group's software. The independent variables were the hiring and assimilation delays described in the documentation provided within each folder. The dependent variables were the staff level, project cost, and completion time. These folders are discussed later in the chapter as well.

All participants had prior experience with the SDM interface in a previous course in a slightly different context. To ensure that they were comfortable with the simulation, a sample report was provided along with a 30 minute review of project management. The participants were also told that a "TEST" run would be accomplished by each participant just prior to the actual simulation. This simulation, called "TEST", and it's

documentation, mirrored the experiment simulation with the exception of the default staff level and project duration.

Participants were not paid monetarily, but were told that they would be assigned a grade based on their performance. This was to insure that they would be serious and diligent in their participation. Disclosure of experiment specifics was held until the day of the experiment so as to better control the knowledge base of the participants.

B.   THE SOFTWARE

There were two primary efforts in the design of the experiment's software; the software interface, and the instructions for its use. Much care was taken to ensure the interface was both easy to use and clear in it's purpose. For each screen, detailed written and on screen documentation was provided to ensure total comprehension of the environment. The purpose of this was to ensure that the participants were capable of using the interface without having to worry about how the simulation works.

1. Software Interface

The SDM software includes the DYN simulator as well as DYNEX files which help model the interface.   The DYNEX file, Proj?.DNX, provides three primary functions: 1) it displays information on the screen to the participant; 2) it captures the staff variable input; and 3) it provides an output format for the simulations reports.   A copy of the DYNEX file is provided in appendix A.

The DYNEX file works directly with the Project?.BAT batch file. This batch file is the primary control file for the entire user interface, and is common to each group

project. This file directs a basic set of files that inter-operate and control the whole simulation. Figure 2-3 illustrates the overall architecture.
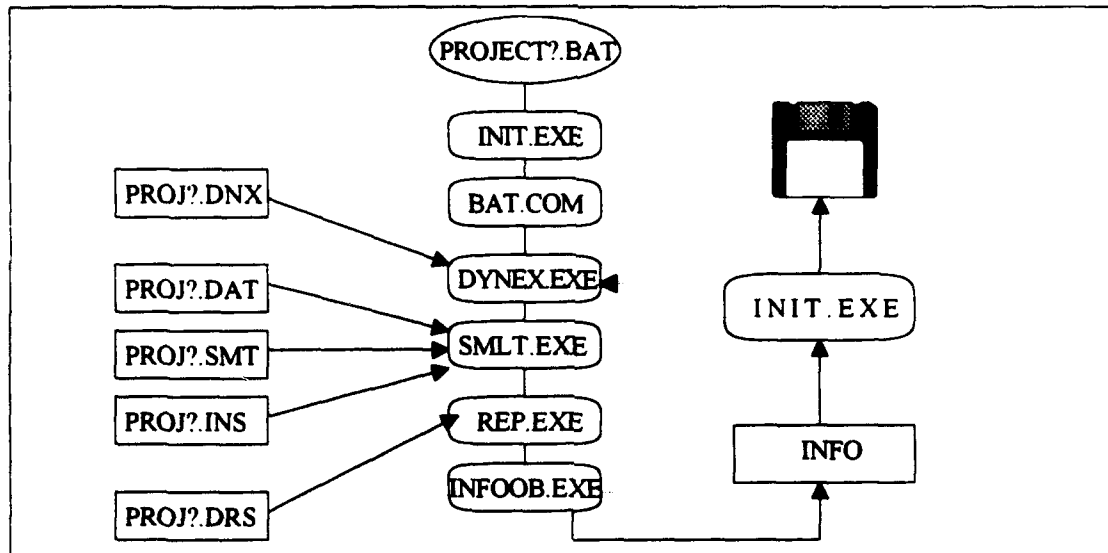
Figure 2-3 Flowchart of basic set of project files

The Project?.BAT invokes the interface, prompts the DYNEX file to provide instructions during each simulation, and controls the display of the status reports as well as the initiation of the next set of inputs. A copy of this batch file is provided in appendix B.

Paramount to the design process was the ability to capture data to files for later analysis. This was done using various .OUT files each feeding or storing information as needed. These .OUT files greatly enhanced later analysis in that they worked collectively to capture critical variable data, especially the staff level (WFS), input by the participant into a cumulative file called INFO for each participant. Figure 2-4 illustrates the INFO file for one participant. These INFO files were later combined for all participants for analysis. As illustrated in this figure, eighteen variables were captured using the various .OUT files and input into appropriate columns. The numerical data in this figure was excerpted from

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a single participants file, however, the column names were added to identify each variable captured. Definitions of these variables can be found in the variable initialization portion of the SAS Control file in appendix M.

PERIOD	NAIVED	OPTHD	OPTAD	OPTHAD	WFNEED	CUMRDCDT	PDVRCT	PTKTSZ	PJBSZ	CMTKDV	CUMMD	SCHCDDT	TIMERMM	FTEQFFX	FRWFEX	TIMEE	STAFF
0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	338	5.00
40.00	5.02	5.39	5.39	6.39	4.97	155.25	10.59	0.00	402.36	45.66	155.25	230.32	190.32	4.22	86.43	470	5.00
80.00	5.06	5.33	5.33	6.36	4.97	332.34	25.61	0.00	424.21	92.00	332.34	243.18	163.18	4.60	86.10	516	4.50
120.00	4.61	4.67	4.67	4.90	4.59	513.31	38.37	0.00	476.05	143.46	513.31	586.02	166.02	4.50	92.88	315	4.50
160.00	4.60	4.66	4.66	4.91	4.57	693.33	47.74	0.00	540.40	200.56	693.33	317.51	157.51	4.50	95.71	252	4.70
200.00	4.77	4.91	4.91	6.49	4.73	875.47	57.04	0.00	583.43	264.07	875.47	331.69	131.60	4.60	95.83	252	6.00
240.00	6.06	9.03	9.03	3.96	5.87	1074.40	68.34	0.00	603.36	338.02	1074.40	315.65	75.60	5.28	87.86	381	6.50

Figure 2-4 Sample of single participants INFO file with added identifiers

Furthermore, timestamp and capture files were included in the simulation to capture the time passage during each of the participants decision intervals. This TIMESTMP feature was transparent to the participant as they had no idea they were being timed on their decisions. Figure 2-5 shows these files as they are encountered within the Project?.BAT file. This feature works in the following sequence: at the start of the decision cycle, when the report, shown in figure 2-1, is viewed by the participant, the TIMESTMP file copies the computer clock time to a temporary file; when the participant completes the interval, the Project?.BAT file loops back to the beginning of the reporting sequence (-top) and updates the simulation files with the new staff level; the CAPTURE file then takes the current clock time, compares it to the temporarily stored TIMESTMP time, and annotates the difference, in seconds, to the INFO file under the column TIME.

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Figure 2-5 illustrates the proper placement of these two files within the Project?.BAT file.

Since the placement of the CAPTURE file needed to come before the looped TIMESTMP

file, an initial TIMESTMP was placed before the CAPTURE file, outside the loop, to feed

it a time, thus this time period has no bearing in the analysis. The entire .BAT file can be

viewed in appendix B.

```
echo off
CLS
init 1
GRAPHICS
bat /N /p /s
  smlt PROJA -go = -prs = -ls -ns -plm 6 -bw
  rep PROJA INTRVAL -outf INTRVAL.OUT -t -bw >NUL
  rep PROJA INTRVAL -outf INTRVL.OUT -bw >NUL
  rep PROJA -t -bw >NUL
  timestmp

-top   dynex PROJA -in PROJA.STT -sc -ls -plm 6 -bw
       smlt PROJA -gm = -ns -plm 6 -bw
       capture
       rep PROJA INTRVAL -outf INTRVAL.OUT -t -bw >NUL
       rep PROJA INTRVAL -outf INTRVL.OUT -bw >NUL
       rep PROJA -bw >NUL
       call -top1
       Exit
       goto -top%A

-top1  timestmp
       %A = 1
       ram
       cls
```

Figure 2-5 Excerpt form Project?.BAT file showing timestmp feature

This time data allowed the designer to analyze decisions made over time both,

within and between groups. This information is presented later in chapter IV.

In all, 27 files, including the base set illustrated in figure 2-3, were needed to

conduct the experiment. Figure 2-6 lists these necessary files.

```
PROJECT?.BAT - Directly controls user interface
TEST.BAT - Directly controls user interface for test portion
INIT.EXE - Asks for student name and SMC box for identification
BAT.COM - Controls BAT files within simulation
DYNEX.EXE - Allows execution of DYNEX files
SMLT.EXE - Primary DYNAMO execution file
REP.EXE - Generates specified report formats
INFOOB.EXE - Strips data from numerical screen inputs
INFO - Collects all report data stripped from INFOOB.EXE
JUNK.OUT - Feeds last report screen output to INFOOB.EXE
INTERVAL.OUT - Contains copy of last output screen
INTERVL.DRS - Screen report format
PROJ?.CHG - DYNAMO generated file
PROJ?.DAT - DYNAMO required file
PROJ?.DNX - Project specific DYNEX file
PROJ?.DRS - Project report file
PROJ?.DYN - Project DYNAMO file
PROJ?.INS - DYNAMO required simulation file
PROJ?.OUT - Captures project inputs from user
PROJ?.RSL - DYNAMO generated file
PROJ?.SMT - DYNAMO required simulation file
PROJ?.WAS - Temp storage for input variables
PROJ?.STT - DYNAMO generated file
PROFXPL?.DRS - Determines variables to be plotted
TIME.TMP - Stores timing data generated by timestmp.exe
TIMESTMP.EXE - Inserts decision timing data from computers clock
CAPTURE.EXE - Captures timing data for participant
```

Figure 2-6 Project related files

Though many variables came into play for this experiment, four primary variables were displayed to the participants in the reports and graphs generated by the simulation model. These were: (WFS) - the staff level requested by the participant; (FTEQWF) - the full time equivalent staff level; (FRWFEX) - the percent of the staff work force currently working on the project that are fully experienced; And lastly, (CMTRMD) - the cumulative person-days spent by experienced staff training the new staff.

2. Software Instructions

To aid the participants in using the software, on screen documentation was provided as displayed in Figure 2-7.

```
********************************************
           !!!! Important Points to Remember !!!!
********************************************
- You are not allowed to discuss this exercise with anyone
  other than a lab attendant.  Please refrain from discussing
  this with members in the other class until they have completed
  the exercise.

- The system will show you the size of the initial core team of
  software developers (the full time equivalent number).  It will
  then ask you for your initial desired staffing level. Next it
  will run through the first simulation time period and show you
  the current reported statistics.  Make your change to the
  desired full time equivalent staffing level on the documentation
  sheet provided after reviewing the report.  There is no need to
  turn in the documentation sheet after each interval.
  A LAB ATTENDANT MUST VERIFY YOUR FINAL RESULTS!

      - GOOD LUCK!      Press <ENTER> to continue.
```

Figure 2-7 Initial screen seen by participant

Following this introduction screen, the participant is shown the initial staffing screen as

displayed in Figure 2-8.

```
          THE INITIAL CORE TEAM OF SOFTWARE
              DEVELOPERS HAS BEEN SET AT:

              3.5    Full time equivalent Personnel

      1) Press <ENTER> to keep that same 3.5 full time equivalent staff.
                            OR
      2) Enter your initial desired staffing level and press <ENTER>.

      [Remember, you are working in full time equivalent personnel.]
```
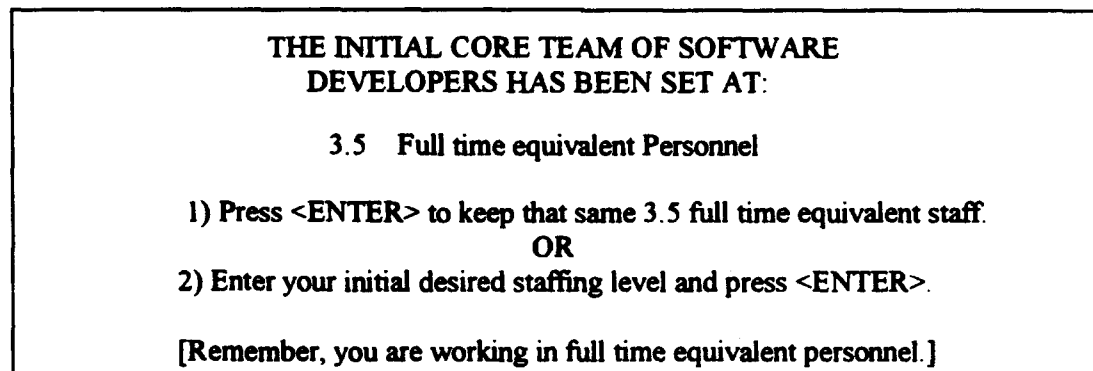
Figure 2-8 Initial staffing screen as viewed by participant

This screen is the first time the participant is shown the initial staff size as provided by the

software.

As a follow on to the report, and as indicated at the bottom of the report screen

in figure 2-1, a graphic   display immediately followed the report plotting the report

information. This was a hardwired feature that intentionally could not be bypassed. Figure 2-9 illustrates the four graphically plotted variables that were displayed on the screen and in the documentation to aid the participants better understand what is being displayed.

```
*********************************************************
            GRAPHICALLY DISPLAYED VARIABLES
         THE FOLLOWING VARIABLES WILL BE PLOTTED:

   WFS  . . . . . . . . . . STAFF LEVEL YOU REQUESTED
   FTEQWF . . . . . . . . CURRENT STAFF LEVEL
   FRWFEX . . . . . . . . PERCENT OF STAFF THAT IS EXPERIENCED
   CMTRMD . . . . . . . CUMULATIVE PERSON-DAYS SPENT ON
                       TRAINING NEW STAFF

      AFTER VIEWING PLOT PRESS <ESC> TO CONTINUE

      PRESS <ENTER> TO VIEW PLOT
*********************************************************
```

Figure 2-9 Plot variable information as viewed by participant

After viewing the graph, the participant, through use of a short menu screen, was given two options: 1) review the report and graph again; or 2) move to the next interval. The purpose here was to insure the participant had full access to the information to make decisions prior to moving to the next interval.

The graph is displayed for the participant following this screen. The graph is depicted with the Y-axis displaying the numeric variable levels as shown in the report, and the X-axis depicting time in forty day intervals that appear incrementally following each successive interval. Numeric upper limits were carefully tested to insure plot information could be calculated given unusual staff level input.

C.   THE DOCUMENTATION

Creating the written documentation for this experiment was an important part in ensuring the experiment's success.   In order to eliminate any external bias in the experiment, it was imperative that the computer interface be maintained exactly the same for all groups. This resulted in the documentation being the only means for conveying the unique delay information to the participant. With this in mind, two primary areas were addressed.

The first area provided clear and extremely detailed procedures for the participant to follow in setting up and conducting the experiment. These procedures fell into three categories: 1) how to insert the disk and boot the experiment up; 2) how to initiate the TRIAL (TEST) run, this area also described in detail what each sequential screen was asking and/or displaying, and how to input the proper response or decision for that screen; and 3) how to run the actual experiment itself, this area included a description of indicators   that would be encountered when the simulation was nearing completion.   A copy of this documentation is contained in appendix D.

The second area concerning the documentation was the most critical in that this was where the delays were described to the participants.   Though the purpose of the experiment, as far as the participant was concerned, was to complete the project on time and on budget, the actual experiment itself rested solely on the way they handled the information about the delays described within their documentation. Copies of the project

specific sets are contained in appendices E through H. Figure 2-10 shows a documentation excerpt.

SOME IMPORTANT THINGS TO CONSIDER IN MAKING YOUR ESTIMATES:
Your primary task is to update the project's staffing level. Every two-month(40 working days) reporting period, you will have the option to adjust the Project's staff level. You may find however, that the actual staff level in the status report is somewhat different from the staff level you chose. This will be due to things you cannot totally control such as delays in hiring.

Because all personnel in the organization are already assigned to other projects, any staff additions you request will be hired from the outside. As a result, there will be a delay in hiring new staff and in assimilating them into your project.

- The hiring delay will be 3 months (i.e., 60 working-days) on average.

- The assimilation delay for a newly hired employee is typically 4 months (i.e., 80 working-days). This is the time it typically takes to train a new employee in the mechanics of the project and bring him/her up to speed. Because the organization does not have a formal training program, the training is done on the job by having one of the experienced staff members spend 25% of his/her time "hand-holding" the new employee. During this 4 month training period, a new employee is typically only half as productive as an experienced employee.

Figure 2-10 Excerpt from ProjectA documentation concerning delays.

This documentation was provided to ensure that the participants were completely aware of these delay periods. Care was taken to write the documentation in such a way as to focus their attention towards this information, and was captioned as being information important to the experiment.

Other related documentation contained information needed by the participant to be totally aware of their responsibilities and to ensure the knowledge each participant had prior to the simulation was equal concerning their respective groups. Figure 2-11 shows this documentation.

PROJECT

The project that you will manage happens to have been a real project conducted in a real organization. The particular organization is on the leading edge in software engineering technology. For the project, you will be given a project profile containing the following initial information:

Estimated Project Size (in Number of Tasks*)
Estimated Project Cost (in Number of Person Days)
Estimated Duration (in Number of Work Days)
Size of the Initial Core Team (in People**)

* A task is a software module that is approximately 50 lines of code in size.
** The Core Team is the group of software professionals that developed the project's requirements' specifications. (Remember, you are taking over at the beginning of the Design Phase).

YOUR TASK

Your objective in setting the staffing level should be to finish on schedule while avoiding a cost overrun. Specifically you should:

  a) complete the project on schedule.
  b) at the lowest possible cost.

Note: Finishing ahead of schedule will not gain you anything. In fact, it may hurt you, since finishing ahead of schedule will probably mean hiring more staff than needed, thus incurring a higher cost than required.

Figure 2-11 Excerpt form ProjectA showing delay information

Though the data was captured to .OUT files, the designer thought it necessary to maintain a Decision Record Sheet to manually record the staffing decisions the participants made during the simulation. This allowed for backup of this critical data as well as certification of the data should the need arise. This record sheet is provided in appendix K.

D.   TRIAL EXPERIMENT

Once the gaming interface and documentation was complete, a trial experiment was conducted to provide feedback on any problems that may be encountered by the

participants. Two students were chosen to participate in the trial experiment based on their understanding of personal computers and their abilities to properly critique this type of interface. The objective of the trial run was to allow observation of the participants interaction with the simulation environment and the documentation. Based on the students participation in this trial run, they were also chosen as lab assistants for the actual experiment. This was advantageous in that they would have prior insight into the simulation environment and would be able to provide useful guidance in the absence of the designer. The specific concerns the designer was attempting to examine were:

- Are the participants comfortable with the gaming environment?

- Are the instructions clear?

- What type of questions do the lab assistants and the designer need to prepare to answer for the participants?

- How long does the experiment take on average?

Following are the majority of observations made during the experiment trial run:

Both participants started the boot procedure without reading the start up documentation. Since the actual experiment will be conducted in a lab where machines boot up to a initial network screen, participants will have to be briefed to follow instructions explicitly as they may enter the network inadvertently. The two participants were briefed to read the instructions carefully.

It was noted that when viewing the plot following the first interval, with no change being made to the staffing level, the lines overlapped each other making it difficult to comprehend what the plot was showing. This was later remedied by briefing the participants that if they choose not to change the staff level the first time around, they will see flat overlapping lines depicting no change for the time period.

One participant tried to bypass the plot and found he could not, he indicated that it was irritating that he could not just review the report without the plot.

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Both subjects spent an excessive amount of time on the TEST portion of the experiment. This posed a potential problem in that the participants may try to learn the system too deeply prior to going onto the experimental phase so as to maximize their grade.

One participant asked if, when the given staff level 3.5, would entering 4.5 mean that he had added one person? The partial person criteria will have to be briefed to the actual participants to ensure they are aware of how the simulation model calculates the staff level.

One participant noted that due to the excruciating slow speed of operating off of the disk rather than the hard drive, the participants are apt to begin to talk amongst themselves.

The participants took different approaches to solving the staffing level. One calculated the level using the established staffing equations, the other operated on intuition alone.

The participant operating intuitively finished after one hour seventeen minutes. At one hour forty five minutes, the remaining participant completed the project.

E.   FINAL PREPARATIONS

Having completed the software development, the written documentation, and the

incorporation of lessons learned from   the   trial   experiment, the final preparations

commenced.

Individual folders were developed for each participant. The documentation was

specifically titled according to the appropriate group (A-D) and placed in folders titled for

that particular group. Group disks were made up and annotated with the group letter and

taped into a protective cover inside the folder. Once a participant had been randomly

assigned to each of the four groups, their individual names were then assigned to a

particular folder and disk for control purposes. This random sample will be discussed in

chapter III. The experiment documentation provided each group was identical with the

exception of the specific group .BAT file was identified (i.e. ProjectA.BAT) for input at the prompt when initiating the actual experiment. These were then filed in their respective folders. Lastly, a TEST and ACTUAL experiment staff level record was placed in each folder along with a pencil. Participants were to arrive at the lab with nothing but a calculator.

Two laboratories were identified for use. These labs were represented in a computer drawing with each computer assigned to a specific group so as to separate the participants within the same group by at least one seat. These identified computers were later assigned to specific participants who were positioned in such a way as to ensure that no two participants of the same group label were in eyesight of each others terminal screen. LAB reservations were made and signs posted to keep non-participants from entering the lab during the experiment. Lab assistant folders were created and provided to the lab assistants. These folders contained seating arrangements, extra disks and documentation, pencils, etc... Also specific instructions were provided as to what the attendants could and could not assist the participants with. In the later case they were directed to consult the designer before taking any action. This added additional control to the experiment environment.

III. CONDUCTING THE EXPERIMENT

A. TASKS AND PROJECT CHARACTERISTICS

After a thirty minute review session, several days to review and learn the report format, and having had prior experience with the game interface, experiment participants were now more comfortable with the upcoming experiment. To ensure maximum preparation was given, participants were briefed that the TEST simulation was scheduled to be conducted immediately preceding the actual experiment.

The simulation was designed to allow the participants to manage the simulation independently. Each participant was tasked to review reports and plots, and then update the project's staffing level every two calendar month (40 working days) interval until project completion. The participants used the interface to input their staffing level decision into the model thus modifying the model report output. The participants were told that their overall course grade would be impacted by their project's results. A statistical comparison of the grades indicated no statistical significance in the means across groups. ($F = 1.12$; d.f.$= 3$; $P > 0.351$)

B. ORGANIZING THE EXPERIMENT

The experimental introduction consisted of a thirty minute classroom training session in which the documentation, seating arrangements, and experimental guidelines were discussed. This also provided an opportunity to settle any last minute questions that may have been generated. The size of the group required that two separate sessions, both requiring the use of two labs simultaneously, be provided. One lab assistant was assigned

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to each of the two labs to provide the individual folders to the participant's and to provide general guidance to the participants during the experiment. Each participant was checked to ensure that their name was assigned to the folder and associated disk they received before starting the experiment. The lab assistants were instructed to ensure everyone started at the same time. As illustrated in appendix J, seating arrangements were predetermined. However, if machines were found to be inoperable, the lab assistants were to reassign participants ensuring that no two participants with the same group identifier were within screen view of each other. Lab assistants were briefed that no guidance on how to calculate the staffing levels or how to interpret the reports was allowed. Each lab assistant had back-up disks and documentation. The experiment was conducted in a single day.

All lab machines were checked the day prior to the experiment. Lab reservations were confirmed and signs posted. A last minute briefing was provided to the lab assistants to ensure all matters were understood. The experiment designer monitored both labs, visiting each approximately every half hour.

C.   THE EXPERIMENTAL SUBJECTS

Participants in this experiment were gathered from two segments of a Software Engineering and Management course, IS4300, at the Naval Postgraduate School. Segment one consisted of 24 students, segment two had 27 students. In order to randomize the sample population and assign them to the four groups, the following matched sample procedure was used [Ref. 4].

An alphabetical list for each segment was used along with a standard table of random digits to perform a two-level randomization [Ref. 5]. Appendix I includes the sample population randomizing worksheet used for each segment. Column A is the alphabetical listing of the participants in each segment. Column B is a two digit random number, taken from the standard table of random numbers [Ref. 5], assigned to each participant. The row of digits chosen was done randomly for each segment. Once the number was assigned, column C was generated listing the participants in numerical sequence. Column D then assigned the participants a number from 1 to 4 in a stepped sequential fashion (i.e. 1234, 2341, 3412, etc...). The final group randomization was accomplished by assigning the group letters A-D to these numbers by randomly assigning a letter to each number 1 through 4. In Column E, these letters were then assigned to the participant whose number was correlated with it.

Prior to conducting the experiment, all participants were checked on the list to ensure they had received the advanced training by matching their name to an attendance sheet taken the day of the training session. It was determined that two participants did not receive this training and they were removed from the experiment. These participants are highlighted on the list in appendix I.

D.   DEPENDENT MEASURES

There are three dependent variables. Information contained in this section can be referenced against figure 2-1 in chapter II. The first of these is the project cost as identified by the "Total Person Days Expended to Date" line. It represents the cost of the

project, in Person Days, at the end of the current interval. Upon project completion, it represents total project cost. Project completion is normally indicated when the "% Development Reported Complete" is 100 percent. However, an 97 percent completion level, accompanied by a elapsed time interval that is not a 40 day multiple, also indicated completion. To ensure all participants completed the project, lab attendants verified that each participant getting a completion indictor completed one more interval with absolutely no changes made. They then compared the two intervals and if the exact same results were experienced the participant could log off.

The second dependent variable measured was the project's completion time. This variable was reflected in the line "New Est of Project Duration (start-end)". This line reflects the estimated completion date at the end of each 40 day interval. The DYNAMO simulation determines this variable on the basis of the status of the project at a specific moment in time. It reflects the projected completion date as calculated by the current input.

The third and final dependent variable was the actual staffing level input by the participants. Though this variable was captured to the INFO file, participants were requested to annotate written documentation sheets to provide a back up if necessary.

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IV. EXPERIMENTAL RESULTS AND ANALYSIS

A.   MODEL OF ANALYSIS

The raw data produced by this single project experiment was input to a file called INFO (figure 2-4) which contained, the final project cost, final completion time, chronological staffing decisions and other necessary information for each participant. Our analysis focused on three dependent variables:

1) Participant performance concerning staffing decisions

2) The absolute value of deviation by the participant from an established optimum

3) The absolute value of the percentage deviation each subject incurred from the optimum

Analysis of this data was conducted using the Statistical Analysis System (SAS). Specifically, the General Linear Model (GLM) procedure was used for multivariate analyses due to the unequal populations within the project groups. Appendix L illustrates the SAS control file from the demographic analysis, and appendix M shows the SAS control file used for the GLM and Repeated Measures analysis. This last file calculated two new variables, Doptimal and Poptimal. Doptimal represents the absolute deviation of the input staff levels for each subject in each interval in comparison to the optimal project staff level for that interval. Poptimal depicts the percentage deviation from the optimal staff level solution for each subject per interval. The following equations illustrate how these two variables are calculated:

$DOPTIMAL_t$ = Absolute value of (Subject Staffing Decision$_t$ - Optimal Staffing Decision$_t$)

$POPTIMAL_t$ = Absolute value of $\dfrac{\text{(Subject Staffing Decision}_t\text{ - Optimal Staffing Decision}_t\text{)}}{\text{Optimal Staffing Decision}_t}$

t= time interval

B. RESULTS

1. Staffing Level Decisions

For each of the four groups, the mean staffing level was determined and plotted against the project time periods. This is shown in figure 4-1.
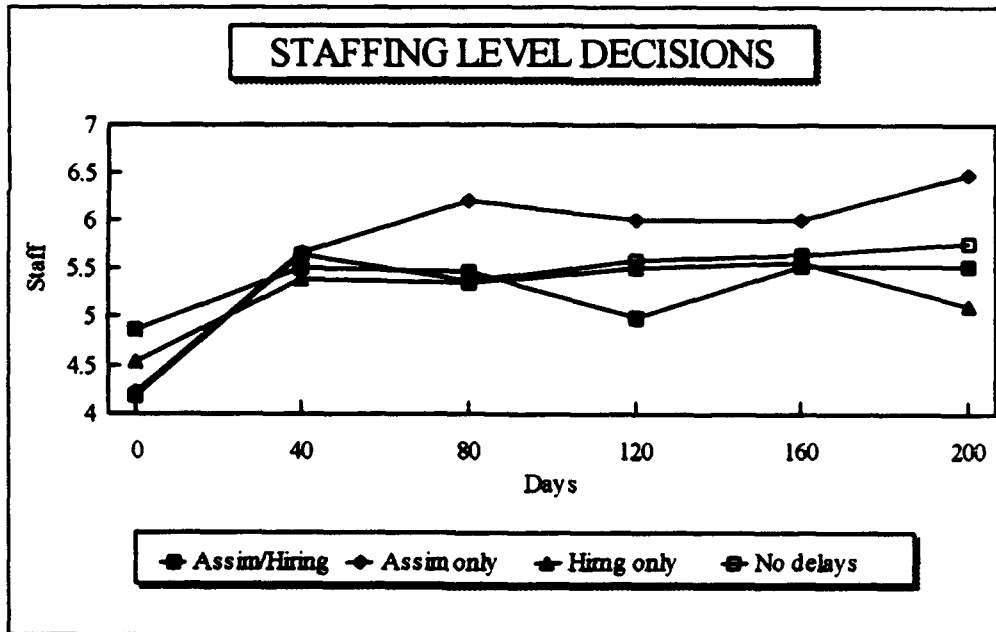
Figure 4-1 Staffing Level Decisions for each group

A significant number of participants completed the project before the seventh period (Time=240). In order to minimize the problem of missing values, only the first six periods were evaluated. The figure illustrates that all four groups initially increased staff size responding to group specific information.

The assimilation and hiring group initially increased its staff size at the 40 day mark in response to the realization that the delays would have significant impact on the project. At day 120, the assimilation and hiring group reduced staff size, but then increased back to the previous level at day 160 and beyond.

The assimilation-only group increased staff size at the 40 and 80 day points as they responded to the realization that assimilation delays would cause the project to fall behind schedule if not compensated for at the beginning of the project. As the project progressed and the staff became more fully assimilated, the participants began to stabilize the staff size trying to meet reported cost and schedule projections. Near the end of the projects lifecycle, they realized that these projections were not fully being met and hired more people. In accordance with 'Brook's Law' [Ref. 1], this decreased the likelihood of a successful completion as adding people to a late project makes it later.

The hiring-only group initially hired staff and then remained steady responding to the project requirements with slight deviations of the staff levels. This indicates that the participants felt they had overcome the hiring delays early on and could maintain current staff levels. However, near the end of the project, they began reducing staff to meet cost and completion schedules.

The no-delay group responded in a similar fashion to the hiring-only group. They hired staff up front, and maintained a steady level reacting to the immediate affects their input had on the project reports.

In conjunction with figure 4-1, Table 4-1 illustrates the repeated measure analysis of the overall staffing level decisions. The Within Subjects results show a significant Period effect (P < 0.05), indicating that the individual participants made different decisions as time progressed. However, the interaction, or PROJECT*PERIOD effect

Table 4-1 REPEATED MEASURE ANALYSIS OF STAFFING LEVEL DECISIONS

Source of variation	SS	Degrees of Freedom	F	Significance of F
Between Subjects				
Project	11.01	3	0.41	0.7478
Subjects-within -Projects	422.71	47		
Within Subjects				
Period	0.561	5,43	6.72	0.0001
Project*Period	0.724	15,119	0.98	0.4755

is not significant (P > 0.05), indicating that the pattern of the decisions made was similar over time across the four groups. There was no significant difference Between Subjects, that is, the overall decisions of the subjects were not significantly different across the four groups (P > 0.1).

2. Deviation of staff levels from optimum (DOPTIMAL)

Figure 4-2 illustrates the mean deviation of input staff levels from the optimum for each of the four project groups. As shown in this figure, assimilation and hiring group's staff level decisions deviated significantly from the optimal at day 80 of the projects lifecycle and continued to deviate for the remainder of the project .This is due to the difficulty each participant encountered handling both the assimilation and hiring delays.

DEVIATION FROM OPTIMAL LEVELS
(By Group)
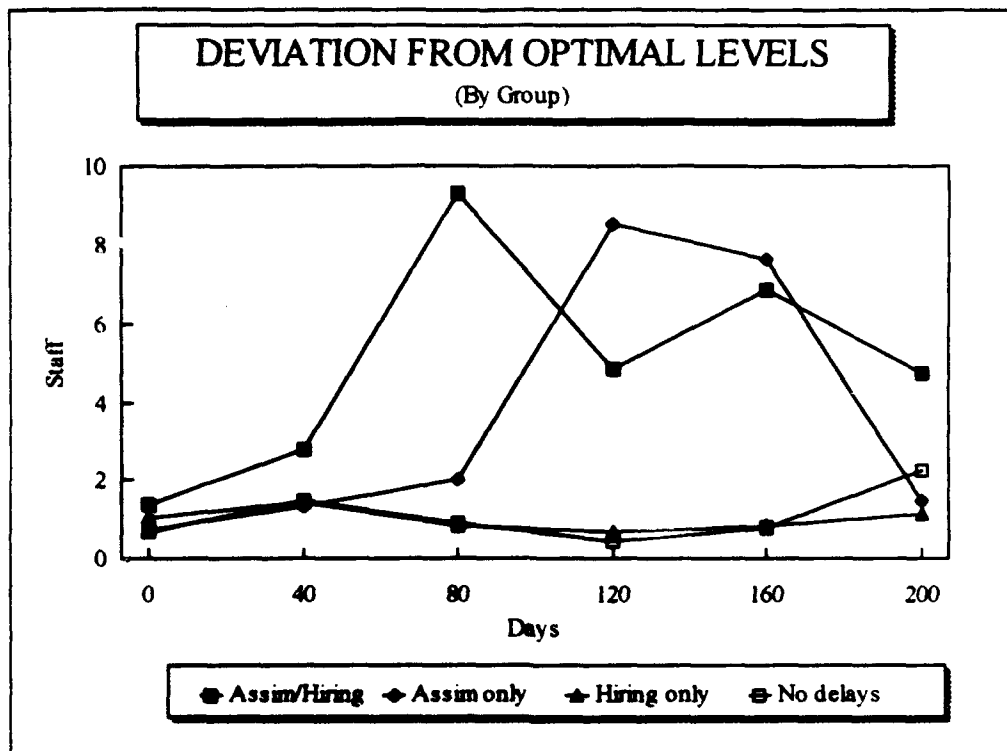
Figure 4-2 Deviation from optimal staff levels for each project (Absolute Value)

The assimilation-only group drastically deviated from the optimum at the 120 day mark. This drastic deviation was due to the participants inaccurate attempt to overcome the high assimilation delay inherent to their project. This group then abruptly shifted back towards the optimum at day 200. The hiring-only group differed from the assimilation and hiring group and the assimilation only group in that it followed the optimal path more closely. As depicted earlier in figure 4-1 analysis, this is due to the more accurate attempt to counter the extreme hiring delays encountered. The no-delay group with minimal delays remained fairly steady along the optimal path as well. This is due to the simulation output giving immediate results the participants allowing them to modify the staff level more

accurately. There was a tendency at the end of the project to hire additional people to meet schedule and cost projections. This is common to most development projects. Table 4-2 shows the repeated measures analysis of the overall deviation of staffing levels from their optimum solutions.

Table 4-2 SUMMARY OF OPTIMAL SOLUTION DEVIATIONS REPEATED MEASURE ANALYSIS

Source of variation	SS	Degrees of Freedom	F	Significance of F
Between Subjects				
Project	917.96	3	3.03	0.0383
Subjects-within				
-Cells	4738.63	47		
Within Subjects				
Period	0.80	5,43	2.08	0.0864
Project*Period	0.784	15,119	0.72	0.7522

The Within Subjects results indicate no significant Period effect ($P > 0.05$), indicating that the individual subjects made similar decisions as time progressed. Furthermore, the interaction or PROJECT*PERIOD effect, is not significant ($P > 0.05$), indicating that the pattern of the decisions made was similar over time between the four groups. There was significance Between Subjects with overall decisions of the subjects being significantly different across the four groups ($P < 0.05$).

3. Percentage deviation of staffing level from Optimal (POPTIMAL)

Figure 4-3 illustrates the percentage deviation of staff levels from the optimal for each group.
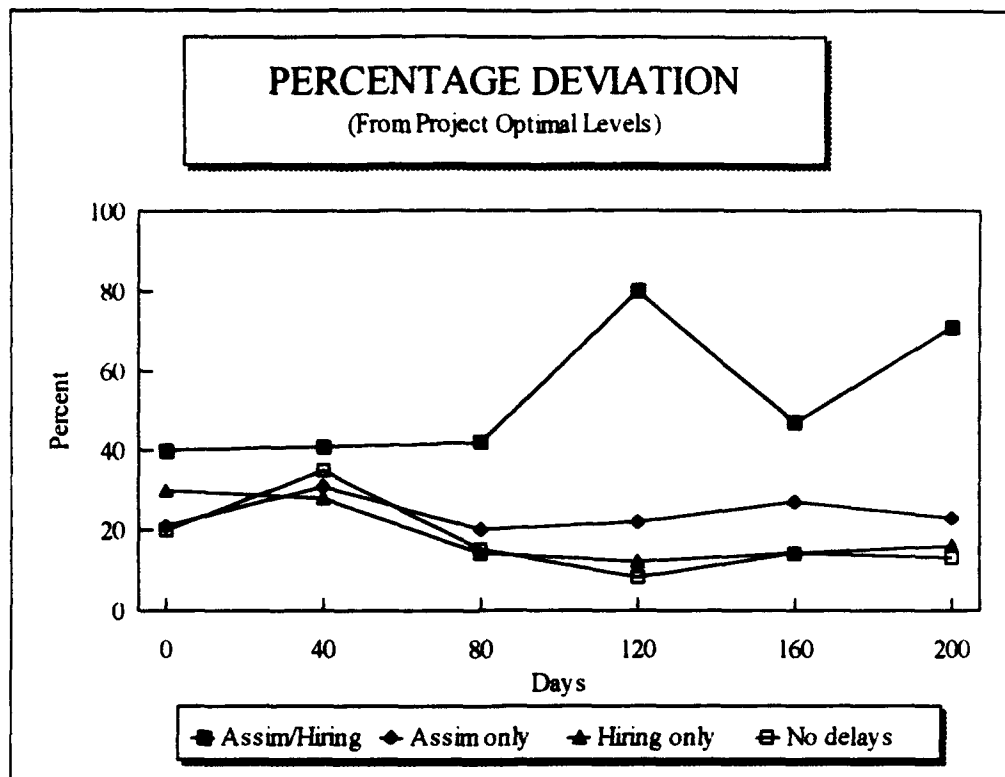
Figure 4-3 Percentage deviations between optimal and actual staff levels

This figure indicates that the Assimilation-only, Hiring-only, and No-delay groups varied similarly, percentage-wise, from the optimal solutions. All three deviated more in the beginning then subsided toward the optimal. Only the assimilation and hiring delay group, varied severely throughout the project. This is due to the dynamic requirements the participants had of keeping track of the delays and their impacts on the project. Participants in assimilation and hiring group had to battle significant delays displayed to them via the project reports and had great difficulty foreseeing the next intervals interaction. The participants were unable to correctly isolate the optimal solution for

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their projects. This is due to the burden managers face when juggling unpredictable information.

Supporting figure 4-3, Table 4-3 illustrates the repeated measures analysis for the overall percentage deviation from the established optimal decision. The Within Subjects results indicate a non-significant Period effect (P > 0.05), indicating that the individual subjects made similar decisions as time progressed.

Table 4-3 REPEATED MEASURE ANALYSIS OF PERCENTAGE DEVIATION FROM OPTIMAL

Source of variation	SS	Degrees of Freedom	F	Significance of F
Between Subjects				
Project	7.02	3	8.87	0.0001
Subjects-within				
-Cells	12.41	47		
Within Subjects				
Period	0.869	5,43	1.29	0.2856
Project*Period	0.766	15,119	0.80	0.6721

Furthermore, the interaction or PROJECT*PERIOD effect, is not significant (P > 0.05), indicating that the pattern of the decisions made was similar over time between the four groups. These results indicate that the overall percentage deviation concerning staffing decisions was not significant across time (P > 0.05). However, a high Between Subjects effect indicates that the overall decisions of the subjects were different across the four groups (P < 0.1).

V. CONCLUSIONS

A.   FINDINGS AND IMPLICATIONS

The objective of this thesis was to conduct an experiment focused on gaining

insight into the implications assimilation and hiring delays have on a single software

project management environment.

This information is critical in that the Department of Defense, as well as other

Federal agencies, are fighting a continuous battle against project cost and schedule

overruns and need to find ways to remedy the situation. Delays heavily impact staffing

decisions throughout the project's life cycle and therefore require in-depth understanding.

This thesis provides empirical findings regarding the project managers behavior when

handling these delays.

The experimental results confirm that excessive delays seriously affect the way a

manager thinks and reacts concerning staffing decisions. Managers faced with significant

assimilation and hiring delays often failed to handle them properly thereby creating adverse

affects to the project. The overall findings of this research indicate that managers make

better staffing level decisions when handling single delays then managers dealing with

projects incurring multiple delays with significant delay periods.

B.   FURTHER RESEARCH

There are several areas that can be potentially researched using the SDM model.

One area to be researched could be to see if a team of managers could better foresee and

handle these associated delays. This could be done by replicating part of this experiment using teams of decision makers to see if the data changes significantly.

Another area to be researched could be determining what information needs to be provided to a manager, and at what time during the project life cycle, to enhance the managers performance in handling delays.

Lastly, perhaps evaluate the effects of delays on an multi-project environment.

APPENDIX A: DYNEX PROGRAM FILE (PROJ?.DNX)

```
if #tm<.1 then
display clear
```
```
                  ****************************************
                  !!!! Important Points to Remember !!!!
                  ****************************************
```

        - You are not allowed to discuss this exercise with anyone
         other than a lab attendant. Please refrain from discussing
         this with members in the other class until they have completed
         the exercise.

        - The system will show you the size of the initial core team of
         software developers (the full time equivalent number). It will
         then ask you for your initial desired staffing level. Next it
         will run through the first simulation time period and show you
         the current reported statistics. Make your change to the
         desired full time equivalent staffing level on the documentation
         sheet provided after reviewing the report. There is no need to
         turn in the documentation sheet after each interval.

A LAB ATTENDANT MUST VERIFY YOUR FINAL RESULTS!

        - GOOD LUCK!   Press <ENTER> to continue.
```
dendq
choice 1
cend 1/1
display clear
```
                THE INITIAL CORE TEAM OF SOFTWARE
                DEVELOPERS HAS BEEN SET AT:

                3.5   Full time equivalent Personnel

        1) Press <ENTER> to keep that same 3.5 full time equivalent staff.
                        OR
        2) Enter your initial desired staffing level and press <ENTER>.

        [Remember, you are working in full time equivalent personnel.]

  The current staffing level =
```
dendq
```

```
dq WFS1=0.5<
display clear
```

```
|**********************************************************|
|            !! IMPORTANT !!                               |
|                                                          |
|    Make sure that you have written your staffing         |
|    level decision down on the documentation sheet        |
|    before continuing with the simulation.                |
|                                                          |
|                                                          |
|    This is your final opportunity to check and           |
|    change the staffing level for this time period.       |
|                                                          |
|    Press <ENTER> to keep the displayed number            |
|                    OR                                    |
|    Change the staffing level and then press <ENTER>.     |
|                                                          |
|                                                          |
|**********************************************************|
```

```
Your subsystem selected staffing level  =
dendq
dq WFS1=0.5<

else

choice 1
cend 1/1
display clear
```

```
        **********************************************************
        * MAKE YOUR CHANGE TO THE DESIRED STAFFING LEVEL    *
        **********************************************************
```

            a) Press <ENTER> to keep the displayed staffing level.
                               OR
            b) Enter the new desired staffing level and press <ENTER>.

[Remember you are working in full time equivalent personnel]

Your last desired staffing level was =

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```
dendq
dq WFS1=0.5<
display clear
```

```
|***********************************************************|
|                    !! IMPORTANT !!                        |
|                                                           |
|   Make sure that you have written your staffing           |
|   level decision down on the documentation sheet          |
|   before continuing with the simulation.                  |.
|                                                           |
|                                                           |
|   This is your final opportunity to check and             |
|   change the staffing level for this time period.         |
|                                                           |
|     Press <ENTER> to keep the displayed number            |
|                       OR                                  |
|   Change the staffing level and then press <ENTER>.       |
|                                                           |
|***********************************************************|
```

```
Your subsystem selected staffing level =
dendq
dq WFS1=0.5<
```

```
end
display clear
```

```
**********************************************************************
*                                                                    *
*      Press <ENTER> to run another interval and see the updated output.  *
*                                                                    *
**********************************************************************
```

```
dendq
choice 1
display clear
```

```
***********************************************************
*                                                         *
*   There will be a long pause as the system calculates your input!   *
*                                                         *
***********************************************************
dendq
report
time=maxtime,
Format="5<,38<,53<",PICTURE="Z,ZZ9V"
"CURRENT INTERVAL STATISTICS:","Elapsed Time =",tm;;
Format="5<"
"INTITIAL ESTIMATES:  (These will not change throughout the project)";
FORMAT="8<,52<,66<",PICTURE="ZZZ,ZZZV"
"Project Size",IPRJSZ,"Tasks";
FORMAT="8<,52<,66<",PICTURE="ZZZ,ZZZV"
"Project Cost",TOTMDO,"Person-Days";
FORMAT="8<,52<,66<",PICTURE="ZZZ,ZZZV"
"Project Duration",TDEV,"Days";;
Format="5<,52<,66<",PICTURE="ZZ,ZZZ9V"
"REPORTED STATISTICS at Time = = = = = =>",tm,"Days";
FORMAT="8<,52<,66<",PICTURE="ZZ,ZZZ9V"
"Updated Estimate of Total Project Size",PJBSZ,"Tasks";
FORMAT="8<,52<,66<",PICTURE="ZZ,ZZZ9V"
"% Development Reported Complete",PDVRC,"Percent";
FORMAT="8<,52<,66<",PICTURE="ZZ,ZZZ9V"
"Total Person Days Expended to-date",CUMMD,"Person Days";
FORMAT="8<,52<,66<",PICTURE="ZZ,ZZZ9V"
"New Est of Project Duration (start-end)",SCHCDT,"Days";
FORMAT="8<,52<,66<",PICTURE="ZZ,ZZZ9V"
"Time Remaining",timerm,"Days";
FORMAT="8<,52<,66<",PICTURE="ZZ,ZZZ9V.99"
"Current Staff Size",FTEQWF,"People";
FORMAT="8<,52<,66<",PICTURE="ZZ,ZZZ9V"
"Percent of Workforce that is Experienced",FRWFEX*100,"Percent";;
FORMAT="5<"
"PRESS <ENTER> TO VIEW THE GRAPHICALLY DISPLAYED VARIABLES";;
cend 1/1
spec md_length=#length+40
```

APPENDIX B: BATCH CONTROL FILE (PROJECT?.BAT)

```
echo off
CLS
init 1
GRAPHICS
bat /N /p /s
smlt PROJA -go = -prs = -ls -ns -plm 6 -bw
rep PROJA INTRVAL -outf INTRVAL.OUT -t -bw >NUL
rep PROJA INTRVAL -outf INTRVL.OUT -bw >NUL
rep PROJA -t -bw >NUL
timestmp


-top    dynex PROJA -in PROJA.STT -sc -ls -plm 6 -bw
        smlt PROJA -gm = -ns -plm 6 -bw
        capture
        rep PROJA INTRVAL -outf INTRVAL.OUT -t -bw >NUL
        rep PROJA INTRVAL -outf INTRVL.OUT -bw >NUL
        rep PROJA -bw >NUL
        call -top1
        Exit
        goto -top%A


-top1   timestmp
        %A = 1
        ram
        cls



-1~1 **** VIEW PROJA STATUS REPORT ******************
        rep PROJA PROJA -outf JUNK.OUT -t -sc -ls -plm 6 -bw
        INKEY %0
        bat /p /s
        cls
        color \1F



-4~1 **** VIEW GRAPHIC STAFFING PLOT ****
        BAT CLS
        BAT COLOR \1F
        BAT BEGTYPE
```

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```
*******************************************************************
  \1A            GRAPHICALLY DISPLAYED VARIABLES            \1F
*******************************************************************

          THE FOLLOWING VARIABLES WILL BE PLOTTED:

          WFS    . . . . . . . . STAFF LEVEL YOU REQUESTED
          FTEQWF . . . . .  CURRENT STAFF LEVEL
          FRWFEX . . . . . PERCENT OF STAFF THAT IS EXPERIENCED
          CMTRMD . . . . . CUMULATIVE PERSON-DAYS SPENT ON
                           TRAINING NEW STAFF


     \1A   AFTER VIEWING PLOT PRESS <ESC> TO CONTINUE  \1F


     \1A   PRESS <ENTER> TO VIEW PLOT   \1F

END
          BAT INKEY %0
          BAT CLS
          REP PROJA PROFXPLA
          BAT /p /s
          color \1F
          ram
          cls
          begtype
          +-----------------------------------------------+
+--------+ \1A              REVIEW MENU              \1F+--------+
]                                                                 ]
]---------------------------------------------------------------]
]                                                                 ]
]   \1F   THIS MENU ALLOWS YOU TO REVIEW THE                      ]
]         STATUS REPORT AND STAFFING PLOT AGAIN                   ]
]   \1F                                                           ]
]                                                                 ]
]                                                                 ]
]      \1D 1 \1F  VIEW YOUR SUBSYSTEM STATUS REPORT AND           ]
]                 PLOT  AGAIN                                     ]
]                                                                 ]
]      \1D 2 \1F  PROCEED TO SIMULATE NEXT TIME PERIOD            ]
]                                                                 ]
+-----------------------------------------------------------------+
Choose an option: (DO NOT HIT <ENTER> AFTER SELECTION!!!!) ;
end
```

```
-1stkey1 inkey %0 | if %0 # = 1 type %0;
        if %0 = key01b return
        goto -%0~1

-2ndkey1 inkey %1 | if %1 # = 1 type %1;
        if %1 = key01b return
        if %1 = key020 goto -$%0$1
        if %1 = key00d goto -$%0$1
        if %1 = key008 goto -top1
        if %1 = key14b goto -top1
        goto -%0%11
```

-2~1 **** PROCEED WITH NEXT SIMULATION *******************

```
        B.T CLS
        BAT COLOR \1F
        BAT BEGTYPE
```

```
*********************************************************************
*                                                                   *
*                                                                   *
*       WRITE YOUR NEW DESIRED STAFFING LEVEL ON THE                *
*           DOCUMENTATION SHEET PROVIDED.                           *
*                                                                   *
*                   PRESS <ENTER>                                   *
*******************************************************************,
END
bat /p /s goto -top

-%0~1
-$%0$1
-%0%11 beep goto -top

-on.error-
 if %R > 82 if %R < 90 type !! Floating Point Error !! |goto -Calc.
 Cls beep type Unexpected batch file error %R in line %L |exit
```

APPENDIX C: BATCH CONTROL FILE (TEST.BAT)

```
echo off
CLS
init 1
GRAPHICS
bat /N /p /s
smlt TEST -go = -prs = -ls -ns -plm 6 -bw
rep TEST INTRVAL -outf INTRVAL.OUT -t -bw >NUL
rep TEST INTRVAL -outf INTRVL.OUT -bw >NUL
rep TEST -t -bw >NUL
timestmp


-top    dynex TEST -in TEST.STT -sc -ls -plm 6 -bw
        smlt TEST -gm = -ns -plm 6 -bw
        capture
        rep TEST INTRVAL -outf INTRVAL.OUT -t -bw >NUL
        rep TEST INTRVAL -outf INTRVL.OUT -bw >NUL
        rep TEST -bw >NUL
        call -top1
        Exit
        goto -top%A


-top1   timestmp
        %A = 1
        ram
        cls


-1~1  **** VIEW TEST STATUS REPORT *******************
        rep TEST TEST -outf JUNK.OUT -t -sc -ls -plm 6 -bw
        INKEY %0
        bat /p /s
        cls
        color \1F



-4~1 **** VIEW GRAPHIC STAFFING PLOT ****
        BAT CLS
        BAT COLOR \1F
        BAT BEGTYPE
```

```
********************************************************************
   \1A          GRAPHICALLY DISPLAYED VARIABLES          \1F
********************************************************************
            THE FOLLOWING VARIABLES WILL BE PLOTTED:

   WFS    . . . . . . . . STAFF LEVEL YOU REQUESTED
   FTEQWF . . . . . CURRENT STAFF LEVEL
   FRWFEX . . . . . . PERCENT OF STAFF THAT IS EXPERIENCED
   CMTRMD . . . . CUMULATIVE PERSON-DAYS SPENT ON TRAINING
                            NEW STAFF


  \1A    AFTER VIEWING PLOT PRESS <ESC> TO CONTINUE  \1F


  \1A    PRESS <ENTER> TO VIEW PLOT  \1F


END
        BAT INKEY %0
        BAT CLS
        REP TEST TESTFXPL
        BAT /p /s
        color \1F
        ram
        cls
        begtype


         +---------------------------------------------------+
+---------+ \1A              REVIEW MENU              \1F+---------+
] \1A                                          \1F                     ]
]-----------------------------------------------------------------------]
]                                                                        ]
]   \1F      THIS MENU ALLOWS YOU TO REVIEW THE                          ]
]            STATUS REPORT AND STAFFING PLOT AGAIN                       ]
]   \1F                                                                  ]
]                                                                        ]
]      \1D 1  \1F VIEW YOUR SUBSYSTEM STATUS REPORT AND                  ]
]                     PLOT AGAIN                                         ]
]                                                                        ]
]      \1D 2  \1F PROCEED TO SIMULATE NEXT TIME PERIOD                   ]
+-----------------------------------------------------------------------+
Choose an option: (DO NOT HIT <ENTER> AFTER SELECTION!!!!)  ;
end
-1stkey1 inkey %0 | if %0 # = 1 type %0;
        if %0 = key01b return
```

```
        goto -%0~1

-2ndkey1 inkey %1 | if %1 # = 1 type %1;
        if %1 = key01b return
        if %1 = key020 goto -$%0$1
        if %1 = key00d goto -$%0$1
        if %1 = key008 goto -top1
        if %1 = key14b goto -top1
        goto -%0%11

-2~1  **** PROCEED WITH NEXT SIMULATION ******************
    BAT CLS
    BAT COLOR \1F
    BAT BEGTYPE
 ****************************************************************
 *                                                              *
 *      WRITE YOUR NEW DESIRED STAFFING LEVEL ON THE            *
 *           DOCUMENTATION SHEET PROVIDED.                      *
 *                                                              *
 *                 PRESS <ENTER>                                *
 ***************************************************************.
                                                                '

END
bat /p /s goto -top

-%0~1
-$%0$1
-%0%11 beep goto -top

-on.error-
 if %R > 82 if %R < 90 type !! Floating Point Error !! |goto -Calc.
 Cls beep type Unexpected batch file error %R in line %L |exit
```

APPENDIX D: EXPERIMENT PARTICIPATION GUIDELINES

********DO NOT START THE NETWORK!!!*********
READ INSTRUCTIONS IN THEIR ENTIRETY BEFORE DOING ANYTHING!!!

A. TRIAL RUN

This TRIAL RUN portion (1 thru 15) of the instruction set will take you through both the initial set up and training portions of the experiment. Follow the instructions carefully. If any problems arise, **immediately** seek out the lab attendant.

1). Insert the disk into the appropriate drive.

2). From the c:\> prompt change to the appropriate drive (ex: b: press <ENTER>)

3). Type TESTat the b:\> prompt to begin the trial run. (ex:TESTpress <ENTER>)

4) You are now looking at the PERSONAL IDENTIFICATION screen. Enter your Last name, press <ENTER>, then enter your SMC number, press <ENTER>.

5). You are now looking at the INTRODUCTORY SCREEN. Please ensure you read it carefully and follow the rules completely!. Press <ENTER>

6). You are now looking at the INITIAL STAFFING LEVEL screen. You can keep the number shown or change the number to any you desire. Press <ENTER>

7). You are now looking at the ENSURE YOUR ANSWER screen. This screen prompts you to document your entry on the document sheet, and allows you to verify the answer you have entered OR change the answer if you like. Press <ENTER>

8). This next screen tells you that you are about to run the interval with the staffing level you have chosen. There is a moderate pause. Press <ENTER>

9). The system will now generate the project report for a period of forty days.. Review this report to become acquainted with the displayed information. Press <ENTER>

10). You are now looking at the GRAPHICALLY DISPLAYED VARIABLES screen. This screen shows you the variables that are going to show up on the plot. It is important that you know these variables and how they relate to each other. These acronyms , their meanings and their scale follow. Press <ENTER>

```
WFS       ....................STAFF LEVEL YOU REQUESTED (0 to24)
FTEQWF    ....................CURRENT STAFF LEVEL (0 to 24)
FRWFEX    ....................PERCENT OF STAFF THAT IS
                             EXPERIENCED (0 to 100)
CMTRMD    ....................CUMULATIVE PERSON-DAYS SPENT ON
                             TRAINING NEW STAFF (0 to 150)
```

11). You are now looking at the VARIABLES PLOT. Take a moment to review the scale of each variable (labeled at top of screen) and how the colored lines vary over time.
- Press <ESC> (pressing anything other than ESC will regenerate the plot)

12). You are now looking at the REVIEW MENU. This menu allows you to press (1) to return to the status report and plot perhaps for another look OR to press (2) to proceed to the next interval. (DO NOT PRESS ENTER AFTER HITTING THE DESIRED NUMBER). Press (2)

13). You are now looking at the PROCEED THROUGH NEXT INTERVAL SCREEN with a prompt for you to document your staffing level. Press <ENTER>.

14). You are now at the CHANGE STAFFING LEVEL screen. Continue through at least two more intervals to become comfortable with the experiment.

15). After you are familiar with the system, proceed until you are looking at the REVIEW MENU. PRESS <ESC>. You will see the Drive Prompt appear.

16) Proceed to section 2.

2. TO RUN THE EXPERIMENT:

1). Follow instructions on the screens as illustrated above in the TRIAL RUN portion. Ensure that you enter your staff decisions on the attached documentation sheet when prompted.

2). The experiment is complete when the (% Development Reported Complete" and % Test Reported Complete" both = 100 **OR** the generated reports cease to increment to another 40 day interval. **(IN EITHER CASE, CHECK WITH THE LAB ASSISTANT BEFORE STOPPING)**.

3) Upon clearance from the lab attendant, exit the system by continuing to the review menu and pressing <ESC>. Take the disk from the machine and place it and all documentation, including your scratch paper, in the folder provided.

4). Type: PROJECTA   to begin the experiment.   **GOOD LUCK!!!**

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YOUR NAME: _____

SMC NO: _____

INTRODUCTION

The exercise you are about to undertake is similar in many ways to the flight simulators that pilots use to mimic flying an aircraft from takeoff at point A to landing at point B. Instead of flying an aircraft, though, this simulator mimics the life of a real software project from the start of the design phase until the end of testing. In this simulation, you will be more than an observer. In fact, you will play an important role on the project: that of the project manager.

Specifically, your role will be to track the project's progress by reviewing status reports that will be produced for you at two-month intervals (40 working days) during the project. As the project manager, you must then update the project's staffing level based on the knowledge you gain from these reports. You can hire additional staff or decrease the staffing level as you deem necessary to complete the project.

PROJECT

The project that you will manage happens to have been a real project conducted in a real organization. The particular organization is on the leading edge in software engineering technology. For the project, you will be given a project profile containing the following initial information:

Estimated Project Size (in Number of Tasks*)
Estimated Project Cost (in Number of Person Days)
Estimated Duration (in Number of Work Days)
Size of the Initial Core Team (in People**)

*   A task is a software module that is approximately 50 lines of code in size.
** The Core Team is the group of software professionals that developed the project's requirements' specifications. (Remember, you are taking over at the beginning of the Design Phase).

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YOUR TASK

Your objective in setting the staffing level should be to finish on schedule while avoiding a cost overrun. Specifically, you should try to :

a) complete the project on schedule.
b) at the lowest possible cost.

Note: Finishing <u>ahead</u> of schedule will not gain you anything. In fact, it may hurt you, since finishing ahead of schedule will probably mean hiring more staff than needed, thus incurring a higher cost than required.

SOME IMPORTANT THINGS TO CONSIDER IN MAKING YOUR ESTIMATES:

Your primary task is to update the project's staffing level. Every two-month (40 working days) reporting period, you will have the option to adjust the project's staff level. You may find however, that the <u>actual</u> staff level in the status report is somewhat different from the staff level you chose. This will be due to things you cannot totally control such as delays in hiring.

Because all personnel in the organization are already assigned to other projects, any staff additions you request will be hired from the outside. As a result, there will be a delay in hiring new staff and in assimilating them into your project.

- The <u>hiring delay</u> will be 3 months (i.e., 60 working-days) on average.

- The <u>assimilation delay</u> for a newly hired employee is typically 4 months

(i.e., 80 working-days). This is the time it typically takes to train a new employee in the mechanics of the project and bring him/her up to speed. Because the organization does not have a formal training program, the training is done on the job by having one of the experienced staff members spend 25% of his/her time "hand-holding" the new employee. During this 4 month training period, a new employee is typically only half as productive as an experienced employee.

APPENDIX F: EXPERIMENT DOCUMENTATION AND INSTRUCTION SET
(SET B)

YOUR NAME: _____

SMC NO: _____

INTRODUCTION

The exercise you are about to undertake is similar in many ways to the flight simulators that pilots use to mimic flying an aircraft from takeoff at point A to landing at point B. Instead of flying an aircraft, though, this simulator mimics the life of a real software project from the start of the <u>design</u> phase until the end of <u>testing</u>. In this simulation, you will be more than an observer. In fact, you will play an important role on the project: that of the project manager.

Specifically, your role will be to track the project's progress by reviewing status reports that will be produced for you at two-month intervals (40 working days) during the project. As the project manager, you must then update the project's staffing level based on the knowledge you gain from these reports. You can hire additional staff or decrease the staffing level as you deem necessary to complete the project.

PROJECT

The project that you will manage happens to have been a real project conducted in a real organization. The particular organization is on the leading edge in software engineering technology. For the project, you will be given a project profile containing the following initial information:

> Estimated Project Size (in Number of Tasks*)
> Estimated Project Cost (in Number of Person Days)
> Estimated Duration (in Number of Work Days)
> Size of the Initial Core Team (in People**)

* A task is a software module that is approximately 50 lines of code in size.
** The Core Team is the group of software professionals that developed the project's requirements' specifications. (Remember, you are taking over at the beginning of the Design Phase).

YOUR TASK

Your objective in setting the staffing level should be to finish on schedule while avoiding a cost overrun. Specifically, you should try to :

a) complete the project on schedule.
b) at the lowest possible cost.

Note: Finishing <u>ahead</u> of schedule will not gain you anything. In fact, it may hurt you, since finishing ahead of schedule will probably mean hiring more staff than needed, thus incurring a higher cost than required.

SOME IMPORTANT THINGS TO CONSIDER IN MAKING YOUR ESTIMATES:

Your primary task is to update the project's staffing level. Every two-month (40 working days) reporting period, you will have the option to adjust the project's staff level. You may find however, that the <u>actual</u> staff level in the status report is somewhat different from the staff level you chose. This will be due to things you cannot totally control such as delays in hiring.

Because all personnel in the organization are already assigned to other projects, any staff additions you request will be hired from the *outside*. As a result, there will be a delay in hiring new staff into your project.

- The <u>hiring delay</u> will be 3 months (i.e., 60 working-days) on average.

- The new staff are hired from a specific contractor with whom the organization has had a long-term relationship. Because the contractor's personnel are very familiar with your organization's projects and development environment, they can be assimilated and brought up to speed very quickly. The assimilation delay for a newly hired employee is typically 12 days. This is the time it typically takes to train the employee in the mechanics of the project and bring him/her up to speed. During this 12 day training period, the employee is typically less productive than an employee already on the project. Because we do not have a formal training program, the training is done on the job by having one of the experienced staff members spend 25% of his/her time "hand-holding" the new employee.

APPENDIX G: EXPERIMENT DOCUMENTATION AND
INSTRUCTION SET
(SET C)

YOUR NAME: _____

SMC NO: _____

INTRODUCTION

The exercise you are about to undertake is similar in many ways to the flight simulators that pilots use to mimic flying an aircraft from takeoff at point A to landing at point B.   Instead of flying an aircraft, though, this simulator mimics the life of a real software project from the start of the <u>design</u> phase until the end of <u>testing</u>.   In this simulation, you will be more than an observer. In fact, you will play an important role on the project: that of the project manager.

Specifically, your role will be to track the project's progress by reviewing status reports that will be produced for you at two-month intervals (40 working days) during the project. As the project manager, you must then update the project's staffing level based on the knowledge you gain from these reports. You can hire additional staff or decrease the staffing level as you deem necessary to complete the project.

PROJECT

The project that you will manage happens to have been a real project conducted in a real organization. The particular organization is on the leading edge in software engineering technology. For the project, you will be given a project profile containing the following initial information:

> Estimated Project Size (in Number of Tasks*)
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> Estimated Duration (in Number of Work Days)
> Size of the Initial Core Team (in People**)

*   A task is a software module that is approximately 50 lines of code in size.
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Your objective in setting the staffing level should be to finish on schedule while avoiding a cost overrun. Specifically, you should try to :

a) complete the project on schedule.
b) at the lowest possible cost.

Note: Finishing _ahead_ of schedule will not gain you anything. In fact, it may hurt you, since finishing ahead of schedule will probably mean hiring more staff than needed, thus incurring a higher cost than required.

SOME IMPORTANT THINGS TO CONSIDER IN MAKING YOUR ESTIMATES:

Your primary task is to update the project's staffing level. Every two-month (40 working days) reporting period, you will have the option to adjust the project's staff level. You may find however, that the _actual_ staff level in the status report is somewhat different from the staff level you chose. This will be due to things you cannot totally control such as delays in hiring.

Because your project is a high priority project, any staff additions you request will be transferred to you from other ongoing projects within the organization rather than hiring people from the outside. This will minimize the delays in transferring new people to the project.

- The _transfer delay_ will be 9 days on average.

- The _assimilation delay_ for a newly transferred employee is typically 80 days. This is the time it typically takes to train the transferee in the mechanics of the project and bring him/her up to speed. Because we do not have a formal training program, the training is done on the job by having one of the experienced staff members spend 25% of his/her time hand-holding" the transferee. During this 80 day training period, the transferee is typically less productive than an employee already on the project.

YOUR NAME: _____

SMC NO: _____

INTRODUCTION

The exercise you are about to undertake is similar in many ways to the flight simulators that pilots use to mimic flying an aircraft from takeoff at point A to landing at point B. Instead of flying an aircraft, though, this simulator mimics the life of a real software project from the start of the design phase until the end of testing. In this simulation, you will be more than an observer. In fact, you will play an important role on the project: that of the project manager.

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PROJECT

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> Estimated Project Size (in Number of Tasks*)
> Estimated Project Cost (in Number of Person Days)
> Estimated Duration (in Number of Work Days)
> Size of the Initial Core Team (in People**)

* A task is a software module that is approximately 50 lines of code in size.
** The Core Team is the group of software professionals that developed the project's requirements' specifications. (Remember, you are taking over at the beginning of the Design Phase).

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a) complete the project on schedule.
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Because the project is a high priority project, any staff additions you request will be transferred to you from other ongoing projects within the organization rather than hiring people from outside. This will minimize the delays in transferring and assimilating new people to the project.

- The **transfer delay** will be 9 days on average.

- The **assimilation delay** for a newly transferred employee is typically 12 days. This is the time it typically takes to train the transferee in the mechanics of the project and bring him/her up to speed. During this 12 day training period, a transferee is typically less productive than an employee already on the project. Because we do not have a formal training program, the training is done on the job by having one of the experienced staff members spend 25% of his/her time "hand-holding" the transferee.

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APPENDIX I: <u>SAMPLE RANDOMIZED POPULATION WORKSHEET</u>

<u>IS4300</u>   <u>SEGMENT ONE</u>

<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>
Bryant	4	0	Lovelace	1	C
Logan	40	1	Meisch	2	B
Lovelace	0	2	Whitten	3	D
Loveless	43	3	Wiedenhoeft	4	A
McDermitt	45	4	Bryant	2	B
McGaha	53	6	Sweeney	3	D
Meisch	1	8	Tutt	4	A
Neilan	34	14	Walters	1	C
Ott	24	16	Sandjojo	3	D
Quinn	42	18	Shadle	4	A
Russo	37	21	Smith	1	C
Sandjojo	16	22	Tillery	2	B
Shadle	18	24	Ott	4	A
Smith	21	26	Walsh	1	C
Stewart	39	29	Suhadi	2	B
Suhadi	29	34	Neilan	3	D
Sweeney	6	35	Tsongas	1	A
Therriault	51	37	Russo	2	B
Tillery	22	39	Stewart	3	D
Tsongas	35	40	Logan	4	A
Tutt	8	41	Weatherford	2	B
VanNederveen	44	42	Quinn	3	D
Walsh	26	43	Loveless	4	A
Walters	14	44	VanNederveen	1	C
Weatherford	41	45	McDermitt	3	D
Whitten	2	51	Therriault	4	A
Wiedenhoeft	3	53	McGaha	1	C

SAMPLE RANDOMIZED POPULATION WORKSHEET

IS4300			SEGMENT TWO		
A	**B**	**C**	**D**	**E**	**F**
Bennett	48	5	Devries	2	B
Biggs	15	7	Bunn	4	A
Bower	10	9	Dwiggins	1	C
Bunn	7	10	Bower	2	B
Buxton	47	11	Crawford	3	D
Carlson	20	12	Cheatum	1	C
Celia	25	13	Dills	2	B
Cheatum	12	15	Biggs	3	D
Clancy	27	17	Johnson	4	A
Crawford	11	19	Freeman	2	B
Day	33	20	Carlson	3	D
Devries	5	25	Celia	4	A
Dills	13	27	Clancy	1	C
Dwiggins	9	28	Fuller	3	D
Freeman	19	30	Lee	4	A
Fuller	28	33	Day	1	C
Gambrino	46	36	Swett	2	B
Hollowell	50	38	Landau	4	A
Johnson	17	46	Gambrino	1	C
Landau	38	47	Buxton	2	B
Lee	30	48	Bennett	3	D
Sufian	52	49	Swanson	1	C
Swanson	49	50	Hollowell	2	B
Swett	36	52	Sufian	3	D

LAB 224   SECTION ONE

LOVELACE		MEISCH		WHITTEN	
WIEDENHOFT		SWEENEY		BRYANT	
WALTERS		TUTT		SANJOJO	

LAB 350

SHADLE		SMITH		TILLERY		OTT
WALSH	MCDERMITT	SUHADI		NIELAN	THERRIAULT	RUSSO
TSONGAS		STEWART	VAN NEDERVEEN	LOGAN
WEATHERFORD	MCGAHA	LOVELESS		QUINN

SIT IN ASSIGNED SEATS
IF PROBLEMS ARISE SEEK OUT
LAB ATTENDANT

LAB 224   SECTION TWO

DEVRIES		BUNN		DWIGGINS	
CRAWFORD		BOWER		DILLS	
HOLLOWELL		BIGGS		JOHNSON	

LAB 350

FREEMAN		CARLSON		CELIA		CLANCY
FULLER		LEE		D A Y		SWETT
LANDAU		GAMBRINO		BUXTON		
BENNETT				SWANSON		

SIT IN ASSIGNED SEATS

IF PROBLEMS ARISE SEEK OUT

LAB ATTENDANT

APPENDIX K: EXPERIMENT DECISION RECORD SHEET

Initial Project Estimates

      Estimated Project Size..............(397 Tasks*)
      Estimated Project Cost ....(1,111 Person Days)
      Estimated Duration.................(320 Working Days)
      Size of the Initial Core Team....(3.5 Full Time Equivalent Personnel**)

*   A task is a software module that is approximately 50 lines of code in size.
** The Core Team is the group of software professionals that developed the project's requirements specifications. (Remember, you are taking over at the beginning of the Design Phase).

Please enter your project staffing decisions below: Your **initial decision** is the initial staff level provided by the system or the change you make to that level.

STAFFING (FULL TIME EQUIVALENT PERSONNEL)

Initial Decision :   _____

Time Elapsed - 40 days: _____

Time Elapsed - 80 days: _____

Time Elapsed - 120 days: _____

Time Elapsed - 160 days: _____

Time Elapsed - 200 days: _____

Time Elapsed - 240 days: _____

Time Elapsed - 280 days: _____

Time Elapsed - 320 days: _____

Time Elapsed - 360 days: _____

Time Elapsed - 400 days: _____

Time Elapsed - 440 days: _____

Time Elapsed - 480 days: _____

Time Elapsed - 520 days: _____

****WHEN YOU ARE DONE, CALL FOR A LAB ATTENDANT ****

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APPENDIX L: DEMOGRAPHIC SAS CONTROL FILE

```
libname datename "c:\sas\saswork\";
data demograp.dat;
  infile "c:\sas\saswork\demofile.txt";
input NUMBER 1-7 NAME $ 19-12 SMC 16-19 PROJ $ 24-27 CURRIC $ 40-42 SEX $
48-50 AGE $ 55-58 WORK $ 62-66 YEARS $ 70-74 COMP $ 79-83 HOURS $ 87-93
GRADE;
list;
proc print;
  title 'Demographic profiles'
proc means;
  var GRADE;
  by proj;
    title 'Statistics for individual project groups';
proc anova;
  classes proj;
  model GRADE=PROJ;
  title 'Grades ANOVA for different teams'
run;
```

APPENDIX M: SAS GLM AND REPEATED MEASURES CONTOL FILE

```
DATA REPEATED (KEEP = LNAME PROJECT PERIOD STAFF);
INFILE "PROC1 DAT";
input lname $ project $ period $ naive opthd optad optha wfneed cummd
    pdvrc ptktst pjbsz cmtkdv cummd schcdt timerm fteqwf frwfex
    time staff;
if(lname='WEATHERF') then delete;



/* Description of data fields
opthd: Optimal hiring delay.
optad: optimal assimilation delay.
optha: optimal hiring and assimilation delay.
wfneed: NASA's decision.
cummd: mandays expended to date.
pdvrc: percentage development complete.
pktst: percentage testing complete.
pjbsz: perceived job size.
cmtkdev: cumulative tasks developed.
schcdt: scheduled completion date.
timerm: time remaining.
fteqwf: current workforce size.
frwfex: percentage workforce size.
Project: A - Hiring+Assimilation delay.
        B - Hiring delay.
        C - Assimilation delay.
        D - No delay.
*/



if   ((period NE '0.00')
   and (period NE '40.00')
   and (period NE '80.00')
   and (period NE '120.00')
   AND (PERIOD NE '160.00')
   AND (PERIOD NE '200.00'))
/* AND (PERIOD NE '240.00'))*/
   then delete;
```

```
/* THIS CODE WAS FOR INITIAL ANALYSIS PORTION*/

   IF    (PROJECT = 'A') THEN OPTIMAL=OPTHA;
   ELSE IF  (PROJECT = 'B') THEN OPTIMAL=OPTHD;
   ELSE IF  (PROJECT = 'C') THEN OPTIMAL=OPTAD;
   ELSE IF  (PROJECT = 'D') THEN OPTIMAL=NAIVE;

IF (OPTIMAL < 0) THEN OPTIMAL = MIN (FTEQWF, NAIVE);

DOPTIMAL = ABS(STAFF-OPTIMAL);
POPTIMAL = ABS(STAFF-OPTIMAL)/OPTIMAL;

DIFNAIVE = ABS(STAFF-NAIVE);
PDFNAIVE = ABS(STAFF-NAIVE)/(NAIVE);


PROC SORT;
  BY PROJECT PERIOD;


PROC PRINT; TITLE ' MJB THESIS STATS '
VAR LNAME PROJECT PERIOD;


PROC MEANS; BY PROJECT PERIOD;
TITLE ' THESIS MEANS LISTING';
proc glm;
 CLASS PROJECT PERIOD;
MODEL STAFF NAIVE OPTAD OPTHD OPTHA
    TIME = PROJECT PERIOD PROJECT*PERIOD; TITLE 'GLM STATS';
MODEL OPTIMAL DOPTIMAL POPTIMAL= PROJECT PERIOD
  PROJECT*PERIOD;

/* THIS IS A SECOND PORTION OF CODE WORKING TOWARDS REPEATED
MEASURES*/

PROC SORT DATA=REPEATED OUT=SORT;
 BY PROJECT LNAME PERIOD;

PROC TRANSPOSE DATA=SORT OUT=TRANS;
  BY PROJECT LNAME;
  ID PERIOD;
```

```
PROC PRINT DATA=TRANS;

 PROC GLM DATA=TRANS;
 CLASS PROJECT;
MODEL _0D00 _40D00 _80D00 _120D00 _160D00 _200D00=PROJECT/NOUNI;

 MEANS PROJECT/SCHEFFE;
  REPEATED PERIOD POLYNOMIAL/SHORT SUMMARY;

PROC MEANS;
 VAR _0D00 _40D00 _80D00 _120D00 _160D00 _200D00;
 BY PROJECT;

run;
```

APPENDIX N: SAS DEMOGRAPHIC FILE

NAME	SMC BOX	PROJ ID	PROJ EXP	CURRIC	SEX	AGE	WORK EXP	YEARS SINCE GRAD	COMP FAMIL	HOURS USE	NUMERIC GRADE
BENNETT	1559	D	N	370	M	28	7	5	6	2	3.3
BIGGS	1401	D	N	370	M	39	21	8	5	10	2.7
BOWER	1810	B	N	370	F	32	10	11	5	20	3.7
BRYANT	2798	B	N	370	M	35	13	7	6	25	2.7
BUNN	2373	A	N	370	M	42	19	14	6	15	3.3
BUXTON	2910	B	Y	370	M	32	14	10	5	12	3.7
CARLSON	2962	D	N	370	M	32	14	10	5	14	3.0
CARVER	2306	B	Y	370	F	31	4	9	5	1	4.0
CELIA	1557	A	N	370	M	27	5	5	9	25	4.0
CLANCY	2904	C	N	370	M	39	21	12	5	10	3.3
CONROY	1286	C	N	370	M	33	14	13	7	16	3.7
CRAWFOR	2089	D	N	370	F	30	7	8	4	4	3.7
DAY	1337	C	N	370	M	28	7	7	8	8	3.7
DEVRIES	1659	B	N	370	M	33	11	11	5	5	3.3
DILLS	2893	B	N	370	M	35	16	7	6	14	4.0
DWIGGIN	2434	C	N	370	M	37	19	7	4	10	3.3
FREEMAN	1020	B	N	370	M	33	16	8	6	6	2.7
FULLER	1259	D	N	370	M	35	12	12	5	3	3.3
GAMBRIN	2189	C	N	370	M	30	7	7	8	10	3.0
HOLLOWE	1191	C	Y	370	M	31	10	4	5	2	3.7
HUBBARD	1110	D	N	370	M	37	20	13	7	3	3.3
JOHNSON	2986	A	N	370	M	30	7	7	7	15	3.7
LANDAU	2271	A	Y	370	M	42	23	17	9	40	3.0
LEE	2847	A	N	370	M	28	10	6	8	15	3.3
LOGAN	2432	A	Y	370	M	31	9	9	7	6	4.0
LOVELAC	1054	C	N	370	M	28	12	6	3	5	4.0
LOVELES	2911	A	N	370	M	30	7	7	6	2	3.7
MCDERMI	1313	D	Y	370	M	26	5	5	9	8	3.7
MCGAHA	1064	C	Y	370	M	30	17	4	9	14	3.0
MEISCH	1294	B	Y	370	M	28	10	6	9	20	3.0
NEILAN	2628	D	Y	370	F	29	7	7	6	5	3.3
OTT	2913	A	N	370	M	28	6	6	7	10	4.0
QUINN	1937	D	N	370	M	28	6	6	7	15	4.0
RUSSELL	2167	D	N	370	M	29	8	8	9	20	2.7
RUSSO	2213	B	Y	370	M	37	16	16	7	10	3.3
SANDJOJ	2111	D	N	370	M	41	17	17	9	30	2.7
SHADLE	2145	A	Y	370	M	44	23	23	7	10	4.0
SMITH	2332	C	Y	370	F	31	8	8	7	12	3.0
SPEGELE	2796	A	N	370	M	29	7	5	7	7	4.0
STEWART	1409	D	Y	370	M	36	13	14	4	15	3.7
SUHADI	2087	B	Y	370	M	43	19	19	6	5	3.3
SWANSON	1515	C	Y	370	M	33	11	11	6	5	4.0
SWEENEY	2905	D	N	370	M	31	9	9	8	10	4.0
SWETT	1088	B	N	370	M	32	16	10	9	10	4.0
THERRIA	1099	A	Y	370	M	32	11	9	7	13	3.7
TILLERY	1879	B	N	370	F	33	12	9	3	1	4.0
TSONGAS	2016	A	N	370	M	29	8	12	7	10	3.3
TUTT	1443	A	N	370	M	27	5	5	6	12	3.0
VANNED	1143	C	Y	370	F	28	6	6	7	12	3.7
WALSH	1377	C	Y	370	M	37	17	17	9	4	3.0
WALTERS	1551	C	Y	370	F	39	20	17	7	25	4.0
WEATHER	1553	B	N	370	M	37	18	5	8	13	3.3
WHITTEN	2765	D	N	370	M	30	8	8	5	8	3.7
WIEDEN	1623	A	N	370	M	34	17	10	1	1	4.0

APPENDIX O: SAS DATA FILE

BENNETT D	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	436	
BENNETT D	40.00	3.50	3.50	3.50	3.50	3.50	139.75	9.69	0.00	402.31	44.65	139.75	317.50	277.50	3.50	99.97	301	
BENNETT D	80.00	7.10	7.12	7.12	7.13	7.10	388.57	28.59	0.00	426.43	111.91	388.57	189.12	109.12	6.96	95.40	443	
BENNETT D	120.00	7.26	7.29	7.29	7.32	7.26	668.25	47.12	0.00	505.86	201.21	668.25	212.61	92.61	7.00	99.80	527	
BENNETT D	160.00	7.17	7.20	7.20	7.23	7.17	948.24	61.64	0.00	576.63	303.16	948.24	234.51	74.51	7.00	99.99	447	
BENNETT D	200.00	7.08	7.10	7.10	7.14	7.08	1228.24	77.55	0.00	604.75	421.03	1228.24	243.28	43.28	7.00	100.00	426	
BENNETT D	240.00	5.34	5.35	5.35	5.25	5.33	1456.95	93.05	0.00	609.91	578.07	1456.95	255.90	15.90	5.33	100.00	387	
BENNETT D	279.00	14.22	3.33	3.33	3.43	3.73	1611.40	100.00	100.00	610.00	609.93	1611.40	279.17	0.17	3.53	100.00	166	
BIGGS D	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	146	
BIGGS D	40.00	3.50	3.50	3.50	3.50	3.50	139.75	9.69	0.00	402.31	44.65	139.75	317.50	277.50	3.50	99.97	264	
BIGGS D	80.00	5.57	5.57	5.57	5.58	5.57	341.93	25.71	0.00	424.79	101.40	341.93	227.06	147.06	5.48	96.66	232	
BIGGS D	120.00	5.67	5.69	5.69	5.70	5.67	561.74	40.57	0.00	491.11	171.11	561.74	253.09	133.09	5.50	99.85	230	
BIGGS D	160.00	5.63	5.64	5.64	5.65	5.63	781.74	51.60	0.00	560.55	248.11	781.74	282.28	122.28	5.50	99.99	223	
BIGGS D	200.00	4.55	4.55	4.55	4.55	4.55	971.57	61.76	0.00	596.83	320.37	971.57	326.08	126.08	4.52	100.00	200	
BIGGS D	240.00	4.50	4.50	4.50	4.50	4.50	1151.73	72.82	0.00	607.90	397.57	1151.73	329.28	89.28	4.50	100.00	231	
BIGGS D	280.00	5.00	5.00	5.00	5.03	5.00	1347.28	85.36	0.00	609.88	498.98	1347.28	321.24	41.24	4.99	99.96	217	
BIGGS D	320.00	.89	4.33	4.33	4.92	8.96	1559.67	98.16	63.06	610.00	609.58	1559.67	321.72	1.72	5.40	99.38	410	
BIGGS D	327.00	34.76	5.19	5.19	5.29	275.28	1597.45	100.00	100.00	610.00	609.91	1597.45	327.01	0.01	5.40	99.57	162	
BOWER B	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	101	
BOWER B	40.00	3.50	3.50	3.50	3.51	3.50	139.17	9.65	0.00	402.30	44.53	139.17	317.64	277.64	3.49	99.90	281	
BOWER B	80.00	6.11	7.16	6.21	7.48	6.11	305.55	23.30	0.00	423.72	92.59	305.55	219.48	139.48	4.71	93.61	285	
BOWER B	120.00	7.26	9.11	7.39	9.89	7.25	518.56	37.63	0.00	479.61	156.96	518.56	226.56	106.56	5.83	95.17	260	
BOWER B	160.00	9.36	20.15	9.65	76.33	8.43	785.70	51.52	0.00	551.63	244.17	785.70	231.05	71.05	7.38	94.77	288	
BOWER B	200.00	7.11	9.14	4.85	7.05		1069.40	67.06	0.00	595.35	352.02	1069.40	265.89	65.89	7.01	100.00	238	
BOWER B	240.00	4.00	3.77	3.99	3.31	4.00	1258.96	79.92	0.00	608.45	437.26	1258.96	314.49	74.49	4.05	100.00	294	
BOWER B	280.00	5.47	3.75	5.97	3.91	8.96	1431.13	90.41	0.00	609.98	560.04	1431.13	306.56	26.56	4.51	97.46	191	
BOWER B	320.00	12.78	5.09	4.16	5.11	11.20	1627.59	99.16	73.65	610.00	609.74	1627.59	321.13	1.13	5.24	96.51	223	
BOWER B	326.00	3341.92	5.60	5.60	5.60	2674.65	1660.03	99.49	93.79	610.00	609.90	1660.03	325.96	0.00	5.60		204	
BRYANT B	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	88	
BRYANT B	40.00	3.50	3.50	3.50	3.51	3.50	139.17	9.65	0.00	402.30	44.53	139.17	317.64	277.64	3.49	99.90	251	
BRYANT B	80.00	4.25	4.42	4.27	4.46	4.25	286.25	22.21	0.00	423.49	88.34	286.25	284.94	204.94	1.83	97.77	262	
BRYANT B	120.00	4.32	4.46	4.34	4.49	4.32	443.75	33.21	0.00	470.97	137.26	443.75	312.27	192.27	4.02	98.74	255	
BRYANT B	160.00	4.09	4.12	4.09	4.13	4.09	603.97	41.35	0.00	534.46	190.69	603.97	361.27	201.27	4.00	100.00	273	
BRYANT B	200.00	4.77	5.04	4.80	5.11	4.77	771.48	49.37	0.00	579.04	249.64	771.48	358.44	158.44	4.34	98.37	236	
BRYANT B	240.00	7.11	10.78	7.28	13.89	6.81	973.64	60.05	0.00	601.34	323.60	973.64	323.93	83.93	5.64	94.33	265	
BRYANT B	280.00	8.26	3.60	8.66	4.67	7.97	1225.57	75.46	0.00	608.71	423.69	1225.57	321.68	41.68	6.84	95.12	217	
BRYANT B	320.00	13.30	8.26	6.50	8.29	12.32	1535.17	94.55	19.44	609.98	606.47	1535.17	322.62	2.62	8.48	95.14	354	
BRYANT B	329.00	2329.83	8.72	8.72	8.72	1865.61	1612.53	100.00	100.00	610.00	609.95	1612.53	328.91	0.00	8.72	95.85	209	
BUNN A	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	338	5.00
BUNN A	40.00	5.02	5.39	5.39	6.39	4.97	155.25	10.59	0.00	402.36	45.66	155.25	230.32	190.32	4.22	86.43	470	5.00
BUNN A	80.00	5.06	5.33	5.33	6.36	4.97	332.34	25.61	0.00	424.21	92.05	332.34	243.18	163.18	4.60	86.10	516	4.50
BUNN A	120.00	4.61	4.67	4.67	4.90	4.59	513.31	38.37	0.00	476.05	143.40	513.31	286.02	166.02	4.50	92.88	315	4.50
BUNN A	160.00	4.60	4.66	4.66	4.91	4.57	693.33	47.74	0.00	540.40	200.52	693.33	317.51	157.51	4.50	95.71	252	4.70
BUNN A	200.00	4.77	4.91	4.91	6.49	4.73	875.47	57.04	0.00	583.43	264.07	875.47	331.69	131.69	4.60	95.83	252	6.00
BUNN A	240.00	6.06	9.03	9.03	3.96	5.87	1074.40	68.14	0.00	603.36	338.02	1074.40	315.65	75.65	5.28	87.86	381	6.50
BUNN A	280.00	6.60	4.84	4.84	5.57	6.42	1298.73	82.78	0.00	609.13	437.60	1298.73	315.47	35.47	5.88	85.63	255	6.50
BUNN A	320.00	6.56	6.07	6.07	6.13	6.49	1540.46	93.06	5.58	610.00	599.78	1540.46	333.48	13.48	6.18	87.95	142	6.50
BUXTON B	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	365	7.00
BUXTON B	40.00	7.08	8.65	7.22	9.14	7.08	176.69	11.85	0.00	402.72	52.28	176.69	172.12	132.12	5.19	91.87	157	9.00
BUXTON B	80.00	9.31	15.64	9.59	21.83	8.74	425.23	31.52	0.00	432.94	123.00	425.23	161.47	81.47	7.05	93.34	223	9.00
BUXTON B	120.00	9.42	19.87	9.64	106.10	8.67	728.16	50.03	0.00	517.82	218.75	728.16	188.15	68.15	8.00	96.89	429	8.00
BUXTON B	160.00	8.20	5.82	8.24	7.21	8.05	1048.17	67.06	0.00	584.51	337.11	1048.17	214.94	54.94	8.00	99.90	152	8.00
BUXTON B	200.00	8.12	7.93	8.22	7.94	8.00	1368.17	85.86	0.00	607.43	496.77	1368.17	221.14	21.14	8.00	100.00	159	7.00
BUXTON B	230.00	81.43	7.01	6.78	7.01	7.05	1587.70	100.00	100.00	609.99	609.93	1587.70	230.03	0.03	7.05	100.00	190	7.00
CARLSON D	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	92	3.50
CARLSON D	40.00	3.50	3.50	3.50	3.50	3.50	139.75	9.69	0.00	402.31	44.65	139.75	317.50	277.50	3.50	99.93	213	3.50
CARLSON D	80.00	3.53	3.53	3.53	3.54	3.53	279.74	21.86	0.00	423.48	86.97	279.74	328.38	248.38	3.50	100.00	322	4.50
CARLSON D	120.00	4.61	4.61	4.61	4.62	4.61	450.84	33.49	0.00	469.72	138.42	450.84	298.26	178.26	4.49	97.96	229	4.50
CARLSON D	160.00	4.60	4.61	4.61	4.61	4.60	630.74	42.96	0.00	535.59	198.41	630.74	332.98	172.98	4.50	99.97	251	5.00
CARLSON D	200.00	5.007	5.008	5.008	5.008	5.007	826.29	52.55	0.00	581.73	267.56	826.29	338.73	138.73	4.99	99.00	180	5.00
CARLSON D	240.00	5.001	5.001	5.001	5.001	5.001	1026.24	63.73	0.00	603.25	346.14	1026.24	348.36	108.36	5.00	99.96	237	5.00
CARLSON D	280.00	5.00	5.00	5.00	5.00	5.00	1226.24	76.59	0.00	609.19	433.004	1226.24	348.56	68.56	5.00	100.00	277	5.00
CARLSON D	320.00	5.00	5.00	5.00	5.00	5.00	1426.24	89.60	0.00	609.98	548.25	1426.24	348.56	28.56	5.00	100.00	197	5.00
CARLSON D	356.90	1715.82	5.00	5.00	5.00	1373.66	1606.24	100.00	100.00	610.00	609.92	1606.24	355.97	0.00	5.00	100.00	221	5.00
CARVER B	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	174	4.50
CARVER B	40.00	4.51	4.72	4.54	4.77	4.51	149.89	10.28	0.00	402.42	46.72	149.89	252.96	212.96	3.97	96.90	411	6.00
CARVER B	80.00	6.11	7.01	6.19	7.29	6.11	330.55	25.16	0.00	425.33	99.34	330.55	216.33	136.33	4.96	95.03	359	6.00
CARVER B	120.00	6.20	6.88	6.26	7.11	6.20	540.17	39.01	0.00	487.81	164.52	540.17	244.65	124.65	5.47	95.06	405	5.00
CARVER B	160.00	5.11	5.19	5.12	5.21	5.11	744.77	49.43	0.00	556.00	235.06	744.77	101.24	141.24	5.01	100.00	439	4.85
CARVER B	200.00	4.90	4.95	4.91	4.99	4.90	940.32	59.45	0.00	594.24	309.00	940.32	323.71	123.71	4.85	100.00	519	5.85
CARVER B	240.00	5.89	9.00	5.97	29.57	5.73	1145.11	71.56	0.00	607.26	393.01	1145.11	310.60	70.60	5.34	97.76	298	5.85
CARVER B	280.00	5.89	5.21	6.00	5.30	5.81	1364.15	85.68	0.00	609.84	504.34	1364.15	313.19	33.19	5.69	98.83	340	5.70
CARVER B	320.00	13.21	5.58	5.22	5.59	11.60	1588.88	98.68	87.02	610.00	609.88	1588.88	320.48	0.48	5.64	99.72	234	4.70
CELIA A	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	116	5.00
CELIA A	40.00	5.02	5.39	5.39	6.39	4.97	155.25	10.59	0.00	402.36	45.66	155.25	230.32	190.32	4.22	86.43	352	5.00
CELIA A	80.00	5.06	5.33	5.33	6.36	4.97	332.34	25.61	0.00	424.21	92.05	332.34	243.18	163.18	4.60	86.10	297	4.60
CELIA A	120.00	4.71	4.78	4.78	5.04	4.69	516.31	38.54	0.00	476.13	143.70	516.31	281.75	161.75	4.60	91.57	204	4.60
CELIA A	160.00	4.70	4.76	4.76	5.07	4.67	700.30	48.19	0.00	540.67	201.48	700.30	312.48	152.48	4.60	94.89	252	5.00
CELIA A	200.00	5.07	5.35	5.35	46.21	5.02	888.57	57.87	0.00	583.78	266.42	888.57	320.82	120.82	4.79	93.91	267	5.00
CELIA A	240.00	5.01	5.25	5.25	4.55	4.99	1082.56	69.15	0.00	603.58	341.58	1082.56	329.44	89.44	4.89	94.82	278	5.50
CELIA A	280.00	5.54	4.20	4.20	4.99	5.47	1284.84	82.37	0.00	609.20	438.53	1284.84	324.43	44.43	5.19	92.67	220	5.00
CELIA A	320.00	5.63	5.20	5.20	5.28	5.57	1495.76	92.00	0.88	609.99	592.75	1495.76	340.26	20.26	5.34	93.51	140	6.00
CELIA A	356.00	265.06	5.60	5.60	5.62	213.18	1693.87	100.00	100.00	610.00	609.90	1693.87	356.01	0.01	5.64	91.92	229	6.00
CLANCY C	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	169	5.00
CLANCY C	40.00	5.00	5.00	5.01	5.01	5.00	186.39	12.70	0.00	402.59	48.29	186.39	224.91	184.91	4.98	79.42	406	7.00
CLANCY C	80.00	7.10	7.11	7.27	7.35	7.07	448.43	33.76	0.00	427.19	105.58	448.41	180.83	100.83	6.98	71.42	440	7.20
CLANCY C	120.00	7.22	7.35	7.95	8.86	7.08	728.24	53.27	0.00	495.81	175.86	728.24	198.33	78.33	7.00	82.73	424	7.00
CLANCY C	160.00	7.18	7.22	5.21	6.11	7.02	1008.24	69.60	0.00	568.62	265.16	1008.24	214.39	54.39	7.00	89.54	888	5.50
CLANCY C	200.00	5.59	5.61	5.42	5.45	5.53	1242.99	84.52	0.00	600.17	186.68	1242.99	236.07	36.07	5.52	100.00	305	3.50
CLANCY C	240.00	3.70	3.72	4.01	4.21	3.67	1402.90	88.22	0.00	609.47	500.93	1402.90	331.38	91.38	3.53	100.00	479	3.00
CLANCY C	280.00	3.00	3.00	2.95	2.77	3.00	1528.15	88.49	0.00	610.00	548.22	1528.15	352.02	72.02	3.01	100.00	272	5.20
CLANCY C	320.00	5.24	5.09	5.17	5.17	5.23	1716.63	97.49	21.37	610.00	605.87	1716.63	325.25	5.25	5.18	71.61	257	5.20
CLANCY C	334.00	24.33	4.94	5.16	5.16	20.50	1789.27	99.48	93.34	610.00	609.86	1789.27	334.12	0.12	5.20	75.95	226	5.20
CONROY C	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	107	5.50
CONROY C	40.00	3.50	3.50	3.50	3.50	3.50	139.75	9.69	0.00	402.30	44.52	139.75	317.50	277.50	3.50	99.46	504	4.60
CONROY C	80.00	4.65	4.65	4.67	4.68	4.65	313.95	24.00	0.00	423.65	89.79	313.95	261.48	181.48	4.59	83.66	285	6.20
CONROY C	120.00	6.15	6.17	6.32	6.39	6.14	541.37	39.68	0.00	474.23	144.88	541.37	238.87	118.87	5.99	76.60	379	6.50
CONROY C	160.00	6.66	6.67	6.96	7.15	6.59	796.79	54.28	0.00	541.81	213.19	796.79	251.49	91.49	6.49	81.62	324	9.00
CONROY C	200.00	9.17	9.23	8.65	8.74	8.98	1134.47	72.98	0.00	587.67	309.56	1134.47	237.51	37.51	8.97	73.22	242	14.00
CONROY C	240.00	16.00	22.55	10.68	10.89	11.97	1587.52	86.75	0.00	607.47	540.74	1587.52	254.53	14.53	11.97	70.88	297	16.00
CONROY C	268.00	165.22	15.00	15.71	15.73	15.84	2000.71	97.48	91.87	609.99	609.87	2000.71	268.05	0.05	15.84	65.48	272	16.00
CRAWFOR D	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	106	4.50
CRAWFOR D	40.00	4.50	4.50	4.50	4.50	4.50	170.84	11.69	0.00	402.77	51.16	170.84	248.95	208.95	4.49	97.90	364	6.00
CRAWFOR D	80.00	6.62	6.64	6.64	6.65	6.62	412.93	30.77	0.00	431.75	119.97	412.93	195.93	115.93	6.48	97.11	128	8.00
CRAWFOR D	120.00	8.30	8.35	8.35	8.40	8.30	719.38	49.52	0.00	514.86	215.45	719.38	197.63	77.63	7.98	96.16	602	8.00
CRAWFOR D	160.00	8.21	8.25	8.25	8.30	8.21	1039.24	66.61	0.00	583.15	333.56	1039.24	215.63	55.63	8.00	99.92	265	6.00

Name																	
CRAWFOR D	200.00	6.06	6.07	6.07	6 08	6.06	1298.91	82.56	0.00	606.93	653.28	1298.91	239.50	39.50	6 0.	100.00	
CRAWFOR D	240.00	9.99	4.55	4.55	5.39	6.00	1539.23	97.29	44.55	609.99	609.14	1539.23	242.40	2.40	6 00	100.00	
CRAWFOR D	253.00	7.44	3.57	3.57	3 68	3.79	1600.32	99.12	94.31	610.00	609.93	1600.32	253.52	0.52	3 74	100.00	
CRAWFOR D	253.00	7.44	3.57	3.57	3 68	3.79	1600.32	99.12	94.31	0.00	609.93	1600.32	0.00	0.52	3 74	100.00	164
DAY C	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3 47	100.00	
DAY C	40.00	3.50	3.50	3.50	3.50	3.50	139.75	9.69	0.00	402.30	44.52	139.75	317.50	277.50	3 50	99 46	
DAY C	80.00	4.85	4.85	4.88	4.89	4.85	320.17	24.39	0.00	423.70	90.44	320.17	252 6.	172 63	4 79	87 54	
DAY C	120.00	6.26	6.27	6.45	6.51	6.24	552.47	40.47	0.00	475.22	146.48	552.47	235.26	115.26	6.09	76 73	
DAY C	160.00	6.97	6.99	7 39	7 74	6.87	818.11	55.66	0.00	543.26	216 92	818 11	244 26	84 26	6 74	80 3.	
DAY C	200.00	4.15	4.15	4.16	4.17	4.15	1008.59	67.37	0.00	587.94	286.62	1008 59	313 18	113 18	4 14	100 00	
DAY C	240.00	3.70	3.70	3.69	3.68	3.70	1160.96	76.70	0.00	605.36	360.14	1160.96	331 5.	91 53	3 71	100 00	
DAY C	280.00	4.52	4.59	5.95	7.04	4.39	1315.24	82.62	0.00	609.56	465.37	1315.24	365 91	85 91	3 90	96 6.	
DAY C	320.00	3.20	3.20	3.18	3.17	3.20	2450.10	83.32	0.00	609.99	518.25	1450.10	4.. 2.	93 2.	3 23	100 00	
DAY C	360.00	6.13	6.20	6.05	6.05	6.11	1668.37	93.05	0.05	610.00	587.72	1668.37	375 59	15 59	6 07	68 0.	
DAY C	384.00	1261.96	5.82	5.82	5.82	1010.73	1810.04	100.00	100.00	610.00	609.87	1810.04	383 91	0.0.	5 82	78 8.	
DEVRIES B	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3 47	100 00	
DEVRIES B	40.00	5.02	5.19	5.06	5.48	5.02	155.25	10.59	0.00	402.48	47.82	155.25	230 3.	190 3.	4 22	91 0.	
DEVRIES B	80.00	9.28	15.73	9.61	20.75	8.82	375.21	27.89	0.00	427.30	109.62	375 21	165 4.	85 4.	6 54	93 1.	
DEVRIES B	120.00	7.26	8.07	7.31	8.51	7.22	642.07	45.24	0.00	502.87	193.48	642.07	216 21	96 21	6 77	94 9.	
DEVRIES B	160.00	7.18	8.10	7.22	9.15	7.09	915.33	59.35	0.00	573.32	291.26	915.33	239 45	79 45	6 88	93 5.	
DEVRIES B	200.00	8.17	5.74	8.38	6.29	7.50	1202.60	75.25	0.00	603.54	407.19	1202.60	241 67	41 67	7 4.	99 18	
DEVRIES B	240.00	11.78	8.33	7.07	8.35	8.49	1522.98	94.71	21.59	609.89	606.99	1522.98	242 72	2 72	8 49	96 84	
DEVRIES B	248.00	43.13	8.53	8.11	8.54	8.60	1591.32	97.49	90.79	609.98	609.91	1591.32	248 13	0.13	9 60	97 47	
DILLS B	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3 47	100.00	104
DILLS B	40.00	3.50	3.50	3.50	3.51	3.50	139.17	9.65	0.00	402.30	44.53	139.17	317.64	277 64	3 49	94 0.	
DILLS B	80.00	4.52	4.77	4.54	4.83	4.52	289.04	22.36	0.00	423.52	88.95	289.04	272 22	192 22	4 3.	97 0.	
DILLS B	120.00	4.38	4.50	4.39	4 53	4.38	450.79	33.66	0.00	472.09	139.23	450.79	308 90	188 9.	4 1.	94 0.	
DILLS B	160.00	4.47	4.58	4.48	4.61	4.47	618.02	42.13	0.00	536.34	194.91	618.02	341 64	181 64	4 4.	93 4.	
DILLS B	200.00	5.42	5.95	5.47	6.11	5.42	799.23	50.90	0.00	580.87	258.50	799.23	334 76	134 76	4 5.	97 4.	
DILLS B	240.00	6.36	8.13	6.46	9.34	6.25	1006.44	62.18	0.00	602.48	336.64	1006.44	328 58	88 58	5 12	98 73	24
DILLS B	280.00	7.86	3.92	8.22	4.77	7.59	1250.62	77.25	0.00	609.02	436.46	1250.62	320 62	40 6.	6 54	91 7.	
DILLS B	320.00	13.57	7.73	6.21	7.75	12.25	1543.61	95.38	25.08	609.99	607.42	1543 61	322 16	2 1.	7 99	91 2.	
DILLS B	328.00	142.18	8.05	7.71	8.06	115.37	1607.73	97.82	93.47	610.00	609.93	1607 73	328 0.	0.0.	9 11	96 26	
DWIGGINS C	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320 00	320.00	3 47	100.00	
DWIGGINS C	40.00	3.50	3.50	3.50	3.50	3.50	139.75	9.69	0.00	402.30	44.52	139.75	317 5.	277 5.	3 50	99 46	
DWIGGINS C	80.00	3.63	3.64	3.65	3.65	3.63	282.85	22.06	0.00	423.42	86.88	282.85	320 5.	240 5.	3 60	96 6.	
DWIGGINS C	120.00	3.78	3.78	3.81	3.82	3.78	429.95	32.45	0.00	468.09	131.48	429.95	341 67	221 67	3 7.	96 87	
DWIGGINS C	160.00	4.08	4.09	4.12	4.13	4.08	587.27	40.52	0.00	528.92	180.07	587.27	362 06	202 06	4 00	95 14	
DWIGGINS C	200.00	5.07	5.07	5.12	5.14	5.07	778.33	49.89	0.00	574.31	236.89	778.33	344 89	144 89	4 99	83 2.	
DWIGGINS C	240.00	5.03	5.03	5.05	5.06	5.02	978.24	61.10	0.00	598.94	303.22	978.24	355 63	115 63	5 00	89 7.	
DWIGGINS C	280.00	6.30	6.31	6.14	6.23	6.30	1210.66	75.76	0.00	607.94	387.87	1210.66	334 17	54 17	6 29	81 17	
DWIGGINS C	320.00	7.21	8.09	5.34	5.47	6.97	1461.48	88.95	0.00	609.89	537.04	1461 48	341 33	21 33	6 00	91 27	
DWIGGINS C	360.00	18.75	5.83	6.23	6.24	16.26	1710.84	99.08	89.57	610.00	609.88	1710 84	360 33	0.33	6 30	91 81	
FREEMAN B	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3 47	100.00	
FREEMAN B	40.00	3.50	3.50	3.50	3.51	3.50	139.17	9.65	0.00	402.30	44.53	139.17	317.64	277.64	3 49	99 90	
FREEMAN B	80.00	6.11	7.16	6.21	7.48	6.11	305.55	23.30	0.00	423.72	92.59	305.55	219 48	139 48	4 71	93 6.	
FREEMAN B	120.00	11.62	89.12	12.26	32.37	9.22	561.44	39.82	0.00	481.09	166.49	561.44	182 97	62 97	7 78	90 20	
FREEMAN B	160.00	9.33	70.69	9.50	1.15	8.71	885.73	57.72	0.00	558.74	274.89	885.73	220 94	60 94	8 38	97 95	
FREEMAN B	200.00	5.06	5.08	5.06	5.09	5.06	1118.93	71.78	0.00	599.65	366.68	1118.93	281 30	81 30	5 06	100.00	
FREEMAN B	240.00	5.00	5.00	5.00	5.00	5.00	1319.67	84.23	0.00	609.12	472.45	1319.67	284 28	44 28	5 00	100.00	
FREEMAN B	280.00	5.46	4.94	3.45	4.95	5.06	1519.48	96.59	24.68	610.00	607.24	1519.48	286 93	6 93	5 00	100.00	
FREEMAN B	307.00	12.46	4.02	3.80	4.03	9.55	1636.85	99.55	94.01	610.00	609.91	1636 85	307 28	0 28	4 06	100.00	
FULLER D	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3 47	100.00	
FULLER D	40.00	5.01	5.01	5.01	5.01	5.01	186.39	12.69	0.00	403.01	54.78	186.39	225.00	185.00	4 99	97 19	
FULLER D	80.00	7.16	7.18	7.18	7.20	7.16	448.43	33.24	0.00	436.29	129.32	448.43	183 87	103 87	6 34	97 7.	
FULLER D	120.00	7.25	7.28	7.28	7.32	7.25	729.24	50.17	0.00	523.23	221.23	729 24	210 32	90 32	5 00	99 88	
FULLER D	160.00	9.22	9.28	9.28	9.37	9.22	1070.62	67.65	0.00	586.05	342.48	1070.62	207.11	47 11	8 96	97 96	
FULLER D	200.00	9.25	9.93	9.93	8.45	9.02	1430.24	89.08	0.00	607.96	537.97	1430.24	212 35	12 35	9 00	99 9.	
FULLER D	219.00	159.04	8.64	8.64	8.82	9.00	1601.23	100.00	100.00	610.00	609.86	1601.23	219 02	0.02	9 20	99 98	
GAMBRINO C	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3 47	100.00	
GAMBRINO C	40.00	5.00	5.01	5.01	5.01	5.00	186.39	12.70	0.00	402.59	48.29	186.39	224.7.	184 91	4 94	79 4.	
GAMBRINO C	80.00	4.55	4.55	6.57	4.58	4.55	371.15	28.97	0.00	425.83	97.55	371.15	254 01	174 01	4 5.	93 4.	
GAMBRINO C	120.00	4.62	4.63	4.69	4.71	4.62	551.23	41.00	0.00	483.48	151.68	551.23	280 56	160 56	4 5.	96 15	
GAMBRINO C	160.00	4.59	4.60	4.66	4.67	4.59	731.23	50.14	0.00	547.72	211.12	731.23	311 39	151 39	4 5.	97 6.	
GAMBRINO C	200.00	4.05	4.05	4.07	4.08	4.05	896.14	58.72	0.00	587.65	271.68	896.14	350 29	150 29	4 01	100.00	
GAMBRINO C	240.00	3.90	3.90	3.90	3.90	3.90	1053.20	68.07	0.00	604.61	336.84	1053.20	360 77	120 77	3 90	100.00	
GAMBRINO C	280.00	5.00	5.00	4.80	4.93	5.00	1243.42	80.10	0.00	609.25	418.52	1243 42	336 15	56 15	4 94	85 23	
GAMBRINO C	320.00	5.48	5.64	4.34	4.52	5.38	1443.32	88.49	0.00	609.98	552.69	1443.32	354 81	34 81	5 00	90 92	
GAMBRINO C	360.00	11.88	4.60	5.82	5.84	10.70	1674.41	98.60	61.68	610.00	609.38	1674 41	361 72	1.72	5 99	84 21	
GAMBRINO C	369.00	60.31	5.71	5.95	5.96	49.45	1728.35	99.33	94.85	610.00	609.86	1728.35	369 05	0.05	6 00	85 81	
HOLLOWELL C	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3 47	100.00	418
HOLLOWELL C	40.00	10.04	10.06	10.43	10.98	9.97	341.85	22.68	0.00	403.86	64.21	341.85	117 10	77 10	9 93	95 9.	
HOLLOWELL C	80.00	7.19	7.21	7.74	8.72	7.10	650.69	50.53	0.00	445.00	136.94	650.69	155 3.	75 3.	7 05	90 39	
HOLLOWELL C	120.00	4.11	4.12	4.18	4.21	4.11	840.67	63.15	0.00	526.98	199.03	840.67	236 47	116 47	4 08	100.00	
HOLLOWELL C	160.00	3.05	3.05	3.07	3.07	3.05	971.00	69.84	0.00	578.40	252.04	971.00	298 11	138 11	3 0.	100.00	
HOLLOWELL C	200.00	3.12	3.13	3.26	3.32	3.10	1091.17	76.39	0.00	601.24	320.75	1091.17	310.14	110 14	3 00	100.00	
HOLLOWELL C	240.00	3.17	3.17	3.24	3.26	3.17	1211.17	76.39	0.00	608.57	382.83	1211.17	428.85	188 85	3 00	100.00	
HOLLOWELL C	280.00	5.06	5.06	5.15	5.19	5.05	1393.35	76.39	0.00	609.88	436.13	1393.35	390 16	110 16	4 96	73 06	
HOLLOWELL C	320.00	5.00	5.00	5.00	5.01	5.00	1593.17	80.68	0.00	610.00	500.65	1593.17	391 47	71 47	5 00	83 47	
HOLLOWELL C	360.00	5.00	5.00	5.00	5.00	5.00	1793.17	90.93	0.00	610.00	575.75	1793.17	391.47	31.47	5.00	89.99	
HUBBARD D	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3 47	100.00	102
HUBBARD D	40.00	7.03	7.04	7.04	7.04	7.03	248.57	16.67	0.00	403.96	68.12	248.57	161.62	123.6.	6 76	95 54	
HUBBARD D	80.00	10.42	10.50	10.50	10.62	10.42	621.53	44.54	0.00	458.68	173.61	621.53	139 26	59 26	9 97	97 10	
HUBBARD D	120.00	8.85	8.92	8.92	9.02	8.85	975.97	65.47	0.00	558.70	297.35	975.97	170 75	50 75	8 52	100.00	
HUBBARD D	160.00	8.75	8.94	8.94	10.43	8.63	1316.20	84.78	0.00	602.77	463.44	1316.20	180 65	20 65	8 50	100.00	
HUBBARD D	200.00	29.97	6.15	6.15	6.34	6.53	1595.87	98.57	93.15	609.99	609.90	1595.87	200 15	0.15	6 53	100.00	
JOHNSON A	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3 47	100.00	296
JOHNSON A	40.00	4.51	4.72	4.72	5.21	4.51	149.89	10.28	0.00	402.34	45.24	149.89	252.96	212.96	3 97	90 31	
JOHNSON A	80.00	5.58	6.17	6.17	9.14	5.28	325.19	24.95	0.00	423.97	91.15	325.19	229 16	149 16	4 72	82 95	
JOHNSON A	120.00	5.13	5.32	5.32	6.30	5.03	516.94	38.47	0.00	475.08	143.08	516.94	268 07	148 07	4 86	87 79	
JOHNSON A	160.00	5.11	5.26	5.26	6.42	5.02	712.72	48.97	0.00	540.11	202.35	712.72	297 15	137 15	4 93	91 6.	
JOHNSON A	200.00	5.07	5.18	5.18	1.93	5.04	910.55	59.38	0.00	583.92	270.00	910.55	315 90	115 90	4 96	94 40	
JOHNSON A	240.00	6.05	10.83	10.83	4.72	5.85	1120.15	71.50	0.00	603.86	350.22	1120.15	347 0.	67 35	5 47	93 42	
JOHNSON A	280.00	6.05	5.40	5.40	5.62	5.95	1344.58	86.17	0.00	609.34	467.20	1344.58	310.30	30.30	5 7.	90 64	
JOHNSON A	320.00	6.11	5.82	5.82	5.84	6.06	1576.60	95.65	19.43	610.00	606.03	1576.60	327.64	7.64	5 96	92 7.	
LANDAU A	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3 47	100.00	
LANDAU A	40.00	3.50	3.50	3.50	3.51	3.50	139.17	9.65	0.00	402.30	44.49	139.17	317.64	277.64	3 49	99 70	
LANDAU A	90.00	5.59	6.31	6.31	9.63	5.24	300.19	23.00	0.00	423.50	88.44	300.19	253 27	153 27	4 47	92 4.	
LANDAU A	120.00	5.65	6.17	6.17	10.16	5.33	489.98	36.37	0.00	471.27	138.43	489.98	258 10	138 10	4 97	82 3.	
LANDAU A	160.00	5.63	6.00	6.00	12.59	5.40	694.51	47.59	0.00	535.85	196.82	694.51	286 98	126 98	5 23	86 4.	
LANDAU A	200.00	5.59	5.88	5.88	3.68	5.50	906.58	58.87	0.00	581.41	265.14	906.58	305 90	105 90	5 36	90 06	
LANDAU A	240.00	5.53	5.94	5.94	5.27	5.50	1122.52	71.46	0.00	603.06	347.07	1122.52	314 22	74 22	5 43	93 11	
LANDAU A	280.00	7.20	5.50	5.50	5.94	6.81	1356.51	86.43	0.00	609.23	470.69	1356.51	304 56	24 56	6 20	96 85	
LEE A	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3 47	100.00	
LEE A	40.00	5.02	5.39	5.39	6.39	4.97	155.25	10.59	0.00	402.36	45.66	155.25	230.32	190.32	4 22	86 43	
LEE A	80.00	7.14	8.93	8.93	18.63	6.05	353.78	26.8.	0.00	424.38	94.29	353.78	200 72	112 70	5 78	78 10	
LEE A	120.00	6.17	6.61	6.61	0.88	5.90	581.34	42.85	0.00	480.17	151.96	581.34	233.3.	113 37	5 78	8. 7.	
LEE A	160.00	6.15	6.56	6.56	4.82	5.94	814.96	55.87	0.00	547.65	220.74	814.96	256 92	96 82	5 83	89 3.	

LEE A	200.00	7.16	18.93	18.93	5.74	6.46	1062.41	69.64	0.00	590.17	305.38	1062.41	258.33	58.33	0.4.	87.06	18. 6.00
LEE A	240.00	5.03	5.02	5.02	5.02	5.02	1276.48	83.56	0.00	606.67	415.86	1276.48	285.08	45.08	5.03	100.00	108. 6.00
LEE A	280.00	5.12	4.84	4.84	4.95	5.09	1476.71	89.13	0.00	609.95	563.51	1476.71	314.49	34.49	5.00	100.00	114. 6.00
LEE A	320.00	9.60	4.81	4.81	4.91	8.66	1676.72	98.88	58.06	610.00	609.54	1676.72	322.30	2.30	5.00	100.00	142. 6.00
LEE A	333.00	7.44	4.25	4.25	4.26	6.80	1736.08	99.64	94.04	610.00	609.93	1736.08	333.26	0.26	4.26	100.00	154. 6.00
LOGAN A	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	47. 3.50
LOGAN A	40.00	3.50	3.50	3.50	3.51	3.50	139.17	9.65	0.00	402.30	44.49	139.17	317.64	277.64	3.49	99.73	66. 3.50
LOGAN A	80.00	7.15	9.18	9.18	88.19	5.86	316.26	23.91	0.00	423.59	90.08	316.26	197.54	117.54	5.20	74.56	470 3.50
LOGAN A	120.00	3.06	3.07	3.07	3.09	3.06	457.90	35.10	0.00	471.32	130.70	457.90	385.20	265.20	3.04	100.00	500 3.50
LOGAN A	160.00	3.31	3.37	3.37	3.47	3.31	581.65	40.98	0.00	528.43	170.70	581.65	407.43	247.43	3.14	97.45	408 3.00
LOGAN A	200.00	11.50	309.27	309.27	2.31	7.18	791.51	50.56	0.00	571.07	223.90	791.51	260.91	60.91	6.98	57.12	348 2.00
LOGAN A	240.00	5.03	5.03	5.03	5.04	5.03	1010.94	64.10	0.00	596.69	290.29	1010.94	344.57	104.57	5.03	90.44	314 2.00
LOGAN A	280.00	10.53	5.09	5.09	6.60	9.41	1265.49	79.36	0.00	607.28	386.11	1265.49	306.10	26.10	7.46	71.15	464 4.00
LOGAN A	320.00	7.52	6.68	6.68	6.88	7.42	1549.98	88.85	0.00	609.92	564.73	1549.98	343.55	23.55	7.01	85.40	346 4.00
LOGAN A	358.00	210.24	7.42	7.42	7.45	169.69	1825.95	99.05	93.88	610.00	609.91	1825.95	358.02	0.02	7.47	86.87	595 4.00
LOGAN A	358.00	210.24	7.42	7.42	7.45	169.69	1825.95	99.05	93.88	0.00	609.91	1825.95	358.00	0.02	7.47	86.87	175 4.00
LOVELACE C	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	73 4.00
LOVELACE C	40.00	4.00	4.00	4.00	4.00	4.00	155.30	10.69	0.00	402.38	45.57	155.30	278.92	238.92	3.99	91.15	70 4.00
LOVELACE C	80.00	5.05	5.06	5.09	5.10	5.05	346.34	26.50	0.00	424.35	93.50	346.34	240.79	160.79	4.99	82.18	70 4.00
LOVELACE C	120.00	5.13	5.14	5.21	5.25	5.13	546.24	40.61	0.00	478.46	147.01	546.24	263.19	143.19	5.00	89.04	171 4.00
LOVELACE C	160.00	6.14	6.15	6.34	6.43	6.11	777.33	52.94	0.00	544.57	211.18	777.33	263.66	103.66	6.99	83.24	135 4.00
LOVELACE C	200.00	6.09	6.10	6.38	6.79	6.03	1017.24	66.37	0.00	587.82	292.36	1017.24	277.40	77.40	6.00	89.76	134 4.00
LOVELACE C	240.00	5.53	5.53	5.43	5.47	5.51	1242.15	80.32	0.00	605.77	395.54	1242.15	289.24	49.24	5.51	99.36	159 4.00
LOVELACE C	280.00	6.03	6.28	5.04	5.14	5.85	1462.23	89.51	0.00	609.87	564.56	1462.23	307.88	27.86	5.50	99.71	144 4.00
LOVELACE C	320.00	11.85	4.73	5.40	5.41	10.52	1682.23	99.18	78.92	610.00	609.85	1682.23	320.97	0.97	5.50	99.82	167 4.50
LOVELACE C	325.00	139.63	5.27	5.46	5.47	112.80	1709.73	100.00	100.00	610.00	609.93	1709.73	325.02	0.02	5.50	99.85	152. 4.50
LOVELESS A	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	43 4.70
LOVELESS A	40.00	4.72	4.99	4.99	5.65	4.70	152.04	10.40	0.00	402.35	45.40	152.04	243.32	203.32	4.07	88.71	146 4.70
LOVELESS A	80.00	4.76	4.95	4.95	5.57	4.71	321.62	24.85	0.00	424.02	90.86	321.62	255.88	175.88	4.38	88.29	179 4.70
LOVELESS A	120.00	4.61	4.71	4.71	5.04	4.59	498.04	37.25	0.00	474.31	140.98	498.04	288.83	168.83	4.44	91.94	190 4.70
LOVELESS A	160.00	4.60	4.67	4.67	4.98	4.57	676.21	46.55	0.00	538.20	196.74	676.21	320.97	160.97	4.47	94.64	201 4.70
LOVELESS A	200.00	3.64	3.66	3.66	3.70	3.64	828.74	54.41	0.00	581.48	250.56	828.74	385.50	185.50	3.61	100.00	141 3.50
LOVELESS A	240.00	3.50	3.50	3.50	3.50	3.50	969.86	62.37	0.00	601.80	305.91	969.86	401.11	161.11	3.50	100.00	254 4.70
LOVELESS A	280.00	4.74	6.20	6.20	2.38	4.61	1122.78	72.17	0.00	608.44	369.36	1122.78	366.81	86.81	4.09	89.02	154 4.70
LOVELESS A	320.00	4.73	2.42	2.42	4.13	4.66	1292.81	83.25	0.00	609.85	454.95	1292.81	370.97	50.97	4.39	88.57	103 4.70
LOVELESS A	360.00	4.75	4.21	4.21	4.45	4.71	1471.61	88.96	0.00	610.00	560.13	1471.61	396.34	36.34	4.54	90.72	142 4.70
LOVELESS A	400.00	8.58	4.39	4.39	4.51	7.79	1654.89	98.59	47.96	610.00	608.90	1654.89	403.23	3.23	4.62	93.15	140 4.70
LOVELESS A	413.00	30.03	4.60	4.60	4.62	24.95	1715.02	100.00	100.00	610.00	609.87	1715.02	413.08	0.08	4.63	93.84	157 4.70
MCDERMIT D	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	350 3.50
MCDERMIT D	40.00	3.50	3.50	3.50	3.50	3.50	139.75	9.69	0.00	402.31	44.65	139.75	317.50	277.50	3.50	99.91	314 4.50
MCDERMIT D	80.00	4.55	4.55	4.55	4.55	4.55	310.84	23.79	0.00	424.00	94.19	310.84	266.45	186.45	4.49	97.98	312 4.50
MCDERMIT D	120.00	4.21	4.21	4.21	4.22	4.21	478.67	35.54	0.00	479.02	146.68	478.67	313.64	193.64	4.11	100.00	238 4.50
MCDERMIT D	160.00	4.35	4.35	4.35	4.36	4.35	647.70	43.82	0.00	543.35	203.70	647.70	342.86	182.86	4.26	99.67	188 5.00
MCDERMIT D	200.00	5.27	5.27	5.27	5.28	5.27	847.31	53.58	0.00	585.22	273.47	847.31	330.66	130.66	5.19	98.33	212 6.00
MCDERMIT D	240.00	6.51	6.51	6.51	6.52	6.51	1095.64	67.34	0.00	604.42	366.85	1095.64	312.56	72.56	6.49	98.11	270 7.00
MCDERMIT D	280.00	7.00	7.00	7.00	7.01	7.00	1371.07	84.80	0.00	609.54	496.94	1371.07	308.12	28.12	6.99	99.27	369 6.50
MCDERMIT D	316.00	236.50	6.28	6.28	6.40	181.79	1609.89	100.00	100.00	610.00	609.95	1609.89	316.01	0.01	6.51	100.00	201 6.00
MCGAHA C	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	161 3.50
MCGAHA C	40.00	3.50	3.50	3.50	3.50	3.50	139.75	9.69	0.00	402.30	44.52	139.75	317.50	277.50	3.50	99.46	296 3.50
MCGAHA C	80.00	3.53	3.53	3.54	3.55	3.53	279.74	21.87	0.00	423.40	86.83	279.74	328.29	248.29	3.50	99.66	240 3.90
MCGAHA C	120.00	3.98	3.99	4.02	4.03	3.98	432.18	32.49	0.00	467.89	131.52	432.18	329.64	209.64	3.90	92.93	165 3.90
MCGAHA C	160.00	3.98	3.98	4.01	4.02	3.98	588.14	40.66	0.00	528.86	180.11	588.14	366.89	206.89	3.90	95.65	141 5.30
MCGAHA C	200.00	5.37	5.38	5.44	5.47	5.37	787.67	50.36	0.00	574.37	238.16	787.67	334.80	134.80	5.29	80.29	187 4.30
MCGAHA C	240.00	4.32	4.32	4.32	4.32	4.32	969.36	60.95	0.00	599.05	303.24	969.36	376.34	136.34	4.32	100.00	235 4.30
MCGAHA C	280.00	4.30	4.30	4.30	4.30	4.30	1141.52	72.01	0.00	607.93	377.35	1141.52	377.07	97.07	4.30	100.00	243 3.90
MCGAHA C	320.00	3.90	3.90	3.82	4.07	3.90	1301.46	82.72	0.00	609.83	463.07	1301.46	386.03	66.03	3.91	100.00	217 3.90
MCGAHA C	360.00	3.94	3.95	3.83	3.85	3.93	1457.52	90.30	0.00	610.00	572.37	1457.52	398.59	38.59	3.90	100.00	144 3.90
MCGAHA C	400.00	6.83	1.32	3.68	3.71	6.25	1613.52	98.88	48.62	610.00	609.05	1613.52	404.22	4.22	3.90	100.00	135 3.90
MCGAHA C	416.00	25.68	3.73	3.88	3.88	21.33	1675.91	100.00	100.00	610.00	609.90	1675.91	416.07	0.07	3.90	100.00	201 3.90
MEISCH B	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	218 3.50
MEISCH B	40.00	3.50	3.50	3.50	3.51	3.50	139.17	9.65	0.00	402.30	44.53	139.17	317.64	277.64	3.49	99.90	445 5.00
MEISCH B	80.00	5.07	5.54	5.13	5.65	5.07	294.83	22.69	0.00	423.59	90.22	294.83	250.03	170.03	4.22	95.71	231 5.00
MEISCH B	120.00	5.14	5.47	5.17	5.56	5.14	472.12	34.93	0.00	474.67	144.90	472.12	277.69	157.69	4.60	97.85	146 5.00
MEISCH B	160.00	5.12	5.33	5.14	5.39	5.12	660.48	44.57	0.00	541.46	207.93	660.48	311.87	151.87	4.80	98.94	149 5.00
MEISCH B	200.00	5.07	5.21	5.08	5.26	5.07	854.52	54.27	0.00	585.61	278.36	854.52	334.26	134.26	4.90	99.47	170 6.00
MEISCH B	240.00	6.04	7.59	6.11	8.93	5.92	1062.18	65.90	0.00	604.63	359.57	1062.18	323.57	83.50	5.43	97.55	198 5.00
MEISCH B	280.00	5.00	8.44	5.00	5.06	5.00	1266.45	79.33	0.00	609.46	450.73	1266.45	340.04	60.04	5.01	99.50	178 4.50
MEISCH B	320.00	4.50	4.52	4.49	4.52	4.50	1451.44	91.69	0.00	610.00	567.56	1451.44	345.60	25.60	4.51	100.00	194 3.00
MEISCH B	360.00	5.63	2.90	1.91	2.92	5.11	1586.27	99.49	70.15	610.00	609.69	1586.27	362.70	2.70	3.02	100.00	176 3.00
MEISCH B	373.00	10.58	2.98	2.82	2.98	9.07	1625.46	100.00	100.00	610.00	609.91	1625.46	373.21	0.21	3.01	100.00	139 3.00
NEILAN D	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	52 4.00
NEILAN D	40.00	4.00	4.00	4.00	4.00	4.00	155.30	10.69	0.00	402.54	47.98	155.30	278.92	238.92	3.99	98.79	304 4.00
NEILAN D	80.00	4.04	4.05	4.05	4.05	4.04	315.25	24.44	0.00	425.59	96.36	315.25	290.19	210.19	4.00	99.95	325 4.00
NEILAN D	120.00	4.10	4.11	4.11	4.11	4.10	475.24	35.10	0.00	481.25	147.13	475.24	321.74	201.74	4.00	100.00	224 5.50
NEILAN D	160.00	5.62	5.63	5.63	5.64	5.62	681.88	45.18	0.00	545.07	213.41	681.88	296.89	136.89	5.48	99.52	241 6.20
NEILAN D	200.00	6.29	6.30	6.30	6.31	6.29	923.51	57.67	0.00	588.29	299.45	923.51	298.79	98.79	6.19	98.87	251 6.20
NEILAN D	240.00	6.21	6.21	6.21	6.21	6.21	1171.44	72.09	0.00	606.14	399.95	1171.44	304.98	64.98	6.20	99.95	209 6.25
NEILAN D	280.00	6.20	6.20	6.20	6.20	6.20	1419.44	88.07	0.00	609.82	532.34	1419.44	305.06	25.06	6.20	100.00	260 6.20
NEILAN D	311.00	22.03	5.88	5.88	6.04	17.43	1611.63	98.66	91.65	610.00	609.93	1611.63	311.18	0.18	6.20	100.00	139 6.20
OTT A	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	59 7.00
OTT A	40.00	7.07	8.64	8.64	25.71	6.07	176.69	11.85	0.00	402.47	47.54	176.69	172.10	132.10	5.19	74.57	404 6.00
OTT A	80.00	6.09	6.54	6.54	15.65	5.79	393.07	30.08	0.00	425.74	99.30	393.07	206.29	126.29	5.59	80.28	289 6.00
OTT A	120.00	6.18	6.67	6.67	2.13	5.90	620.98	45.76	0.00	486.77	159.84	620.98	228.39	108.39	5.79	85.90	277 4.50
OTT A	160.00	4.60	4.66	4.66	5.42	4.56	813.65	56.45	0.00	553.33	224.24	813.65	290.94	130.94	4.52	100.00	257 5.00
OTT A	200.00	5.07	5.62	5.62	3.55	4.85	999.63	66.11	0.00	591.79	295.56	999.63	294.91	94.91	4.75	96.23	226 5.50
OTT A	240.00	5.54	1.30	1.30	4.77	5.23	1197.80	78.43	0.00	606.49	383.45	1197.80	294.03	54.03	5.12	92.45	226 5.50
OTT A	280.00	6.68	3.40	3.40	4.74	6.33	1406.62	87.34	0.00	609.80	530.62	1406.62	314.87	34.87	5.30	92.88	201 5.50
OTT A	320.00	7.46	5.20	5.20	5.31	7.05	1620.89	97.03	27.63	610.00	607.43	1620.89	325.21	5.21	5.40	94.41	129 5.50
OTT A	341.00	38.23	5.39	5.39	5.41	31.67	1734.61	99.48	94.44	610.00	609.90	1734.61	341.07	0.07	5.43	95.25	136 5.50
QUINN D	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	78 5.00
QUINN D	40.00	5.01	5.01	5.01	5.01	5.01	186.39	12.69	0.00	403.01	54.78	186.39	225.00	185.00	4.98	97.19	137 4.50
QUINN D	80.00	5.09	5.10	5.10	5.10	5.09	386.25	29.50	0.00	432.84	115.44	386.25	237.12	157.12	5.00	99.88	280 4.50
QUINN D	120.00	4.63	4.63	4.63	4.64	4.63	571.16	40.76	0.00	505.12	175.02	571.16	290.04	170.04	4.51	100.00	224 4.50
QUINN D	160.00	4.58	4.59	4.59	4.59	4.58	751.24	49.21	0.00	565.14	238.16	751.24	321.99	161.99	4.50	100.00	328 4.50
QUINN D	200.00	4.54	4.54	4.54	4.55	4.54	931.24	58.45	0.00	596.69	306.48	931.24	338.75	138.75	4.50	100.00	134 4.00
QUINN D	240.00	4.00	4.00	4.00	4.00	4.00	1096.15	68.85	0.00	607.55	374.85	1096.15	357.79	117.79	4.01	100.00	205 4.50
QUINN D	280.00	4.50	4.50	4.50	4.50	4.50	1271.77	80.00	0.00	609.79	455.48	1271.77	345.66	65.66	4.49	99.00	159 4.50
QUINN D	320.00	4.50	4.50	4.50	4.50	4.50	1451.73	91.70	0.00	610.00	572.15	1451.73	345.68	25.68	4.50	99.96	140 4.50
QUINN D	352.00	14.12	4.32	4.32	4.41	12.20	1595.73	100.00	100.00	610.00	609.89	1595.73	352.17	0.17	4.50	100.00	135 4.50
RUSSELL D	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00	320.00	3.47	100.00	77 3.50
RUSSELL D	40.00	3.50	3.50	3.50	3.50	3.50	139.75	9.69	0.00	402.31	44.65	139.75	317.50	277.50	3.50	99.91	740 4.00
RUSSELL D	80.00	4.04	4.04	4.04	4.04	4.04	295.29	22.82	0.00	423.71	90.56	295.29	293.55	213.55	3.99	98.85	147 4.50
RUSSELL D	120.00	4.61	4.62	4.62	4.63	4.61	470.79	34.85	0.00	474.84	144.62	470.79	296.16	176.16	4.49	98.94	217 4.50
RUSSELL D	160.00	4.60	4.61	4.61	4.61	4.60	650.74	44.04	0.00	541.22	205.29	650.74	331.21	171.21	4.50	99.98	145 5.00
RUSSELL D	200.00	5.07	5.07	5.07	5.08	5.07	846.29	53.66	0.00	584.90	275.01	846.29	335.98	135.98	4.99	99.08	163 5.00
RUSSELL D	240.00	5.00	5.00	5.00	5.00	5.00	1046.24	65.04	0.00	604.32	354.36	1046.24	344.19	104.19	5.00	99.96	159 5.00
RUSSELL D	280.00	5.50	5.50	5.50	5.50	5.50	1261.78	78.68	0.00	609.39	447.32	1261.78	335.60	55.10	5.49	99.16	218 5.50
RUSSELL D	320.00	5.50	5.50	5.50	5.50	5.50	1481.73	92.98	0.07	610.00	588.69	1481.73	335.62	15.2	5.50	99.96	152 3.50
RUSSELL D	352.00	15.00	3.37	3.37	3.47	12.72	1612.98	100.00	100.00	610.00	609.91	1612.98	352.16	0.16	3.58	100.00	156 4.00

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RUSSO B      0.00    3.47    3.47   3.47   3.47   3.47      0.00     0.00    0.00   396.50     0.00     0.00  320.00   320.00   3.47  120.00   4?    5.00
RUSSO B     40.00    5.02    5.39   5.06   5.48   5.02    155.25    10.59    0.00   402.48    47.82   155.25  230.32   190.32   4.2?   95.66  224    5.00
RUSSO B     80.00    5.07    5.35   5.10   5.62   5.07    332.34    25.49    0.00   426.03   100.36   332.34  244.37   164.37   4.6?   97.93  ??     4.50
RUSSO B    120.00    4.62    4.69   4.83   4.71   4.62    513.31    37.46    0.00   487.54   157.99   513.31  293.45   173.45   4.50  100.00  ??     4.50
RUSSO B    160.00    4.59    4.65   4.60   4.66   4.59    693.33    46.19    0.00   552.41   219.90   693.33  320.05   168.05   4.50  100.00  174    4.50
RUSSO B    200.00    5.59    6.19   5.64   6.61   5.59    884.04    55.63    0.00   590.79   289.34   884.04  319.13   119.13   4.99   97.60  214    6.50
RUSSO B    240.00    6.56   10.90   6.68  29.21   6.32   1099.76    68.03    0.00   606.09   373.86  1099.76  311.54    71.54   5.73   98.77  226    7.00
RUSSO B    280.00    7.11    5.40   7.4?   5.69   6.90   1342.45    83.37    0.00   609.69   485.81  1342.45  311.86    31.86   6.35   97.50  299    7.00
RUSSO B    320.00   28.85    6.61   6.31   6.62  24.10   1603.33    98.38   92.10   610.00   609.92  1603.33  320.14    0.14    6.67   98.75  ??     7.00

SANDJOJO D    0.00    3.47    3.47   3.47   3.47   3.47      0.00     0.00    0.00   396.50     0.00     0.00  320.00   320.00   3.47  100.00  118    4.50
SANDJOJO D   40.00    3.50    3.50   3.50   3.50   3.50    139.75     9.69    0.00   402.31    44.65   139.75  317.50   277.50   3.50   99.93  ??     4.50
SANDJOJO D   80.00    4.55    4.55   4.55   4.55   4.55    310.84    23.79    0.00   424.00    94.19   310.84  266.45   186.45   4.49   97.96  190    4.50
SANDJOJO D  120.00    5.66    5.67   5.67   5.68   5.66    521.84    37.92    0.00   481.45   158.43   521.84  256.94   136.94   5.49   98.26  ??     4.50
SANDJOJO D  160.00    4.35    4.36   4.36   4.36   4.35    704.33    47.52    0.00   550.68   219.73   704.33  331.95   171.95   4.28  100.00  43?    4.7?
SANDJOJO D  200.00    4.82    4.82   4.82   4.83   4.82    890.45    56.62    0.00   590.21   287.27   890.45  334.29   134.29   4.76   99.04  174    5.00
SANDJOJO D  240.00    5.60    5.60   5.60   5.61   5.60   1106.93    69.05    0.00   605.91   372.22  1106.93  320.40    80.40   5.59   98.53  ??     ?.00
SANDJOJO D  280.00    5.90    5.90   5.90   5.90   5.90   1340.17    84.00    0.00   609.67   484.87  1340.17  316.80    36.80   5.90   99.48  ??     ?.4?
SANDJOJO D  320.00   23.05    6.09   6.09   6.26  19.49   1592.31    98.46   92.94   610.00   609.92  1592.31  320.17    0.17    6.4?   99.24  ??     6.4?

SHADLE A      0.00    3.47    3.47   3.47   3.47   3.47      0.00     0.00    0.00   396.50     0.00     0.00  320.00   320.00   3.47  100.00  ??     ?.50
SHADLE A     40.00    3.50    3.50   3.50   3.50   3.50    139.17     9.65    0.00   402.30    44.49   139.17  317.64   277.64   3.49   99.7?  ??     4.10
SHADLE A     80.00    4.56    4.82   4.82   5.54   4.52    289.47    22.39    0.00   423.64    87.43   289.47  270.32   190.32   3.98   90.3?  ??     4.10
SHADLE A    120.00    5.13    5.53   5.53   7.21   4.96    459.61    34.31    0.00   469.16   134.65   459.61  277.68   157.68   4.48   86.2?  ??     4.5?
SHADLE A    160.00    4.60    4.66   4.66   4.87   4.58    638.96    43.99    0.00   532.11   187.86   638.96  327.91   167.91   4.48   97.6?  ??     4.4?
SHADLE A    200.00    4.87    5.04   5.04   6.23   4.83    821.84    53.29    0.00   577.62   247.83   821.84  340.48   140.4?   4.6?   91.5?  ??     4.4?
SHADLE A    240.00    5.86    7.16   7.16   3.25   5.73   1019.89    64.23    0.00   600.81   317.59  1019.89  329.99    89.99   5.21   87.5?  ??     ?.4?
SHADLE A    360.00   14.27    5.64   5.64   5.68  12.56   1605.02    99.17   85.78   610.00   609.85  1605.02  360.56    0.56    5.90   92.84  ??     ?.??
SHADLE A    363.00 2209.96    5.72   5.72   5.72 1769.11   1702.18   100.00  100.00   610.00   609.91  1702.18  362.94    0.00    5.7?   44.0?  ??     ?.??

SMITH C       0.00    3.47    3.47   3.47   3.47   3.47      0.00     0.00    0.00   396.50     0.00     0.00  320.00   320.00   3.47  100.00  ??     ?.??
SMITH C      40.00    3.50    3.50   3.50   3.50   3.50    139.75     9.69    0.00   402.30    46.52   139.75  317.50   277.50   3.50   99.46  154    4.??
SMITH C      80.00    4.04    4.04   4.06   4.06   4.04    295.29    22.84    0.00   423.51    87.96   295.29  293.3?   213.36   3.99   91.35  ??     4.??
SMITH C     120.00    4.09    4.09   4.13   4.14   4.09    455.24    34.24    0.00   469.88   134.59   455.24  319.15   199.15   4.00   94.65  ??     5.00
SMITH C     160.00    5.11    5.12   5.19   5.21   5.11    646.33    44.17    0.00   532.41   188.83   646.33  309.86   149.86   4.99   93.5?  ??     ?.00
SMITH C     200.00    5.07    5.07   5.13   5.15   5.07    846.24    54.69    0.00   578.10   251.30   846.24  330.13   130.13   5.00   90.17  148    5.00
SMITH C     240.00    5.02    5.02   5.05   5.07   5.02   1046.24    66.09    0.00   601.25   324.52  1046.24  328.59    95.53   5.00   94.04  ??     ?.00
SMITH C     280.00    6.00    6.01   5.95   5.97   6.00   1277.33    80.52    0.00   608.68   418.94  1277.33  324.??    44.77   5.99   85.7?  ??     ?.00
SMITH C     320.00    6.38    6.76   5.83   5.86   6.31   1517.24    91.95    0.47   609.98   591.54  1517.24  338.09    18.09   6.3?   91.2?  186    6.00

SPEGELE A     0.00    3.47    3.47   3.47   3.47   3.47      0.00     0.00    0.00   396.50     0.00     0.00  320.00   320.00   3.47  100.00  ??     5.00
SPEGELE A    40.00    5.02    5.39   5.39   6.39   4.97    155.25    10.59    0.00   402.36    45.66   155.25  230.32   190.32   4.2?   86.43  ??     5.00
SPEGELE A    80.00    5.06    5.33   5.33   6.36   4.97    332.34    25.61    0.00   424.21    92.05   332.34  243.18   163.18   4.60   86.1?  219    5.50
SPEGELE A   120.00    5.66    6.17   6.17  11.34   5.33    525.96    39.04    0.00   476.33   144.72   525.96  253.06   133.06   5.04   85.62  206    5.50
SPEGELE A   160.00    5.63    5.99   5.99  43.99   5.40    732.45    50.15    0.00   541.66   205.68   732.45  281.15   121.15   5.26   86.3?  375    6.50
SPEGELE A   200.00    6.63    8.79   8.79   4.26   5.94    956.25    62.05    0.00   585.26   278.06   956.25  281.33    81.33   5.8?   85.90  249    7.00
SPEGELE A   240.00    7.10    4.36   4.36   6.01   6.50   1203.07    76.63    0.00   604.63   370.32  1203.07  285.30    45.30   6.4?   85.53  212    7.00
SPEGELE A   280.00    6.66    5.62   5.62   6.28   7.69   1466.07    88.72    0.00   609.65   542.24  1466.07  301.31    21.31   6.70   88.37  212    7.00
SPEGELE A   320.00   17.08    6.75   6.75   8.80  15.38   1737.36    98.90   83.38   610.00   609.86  1737.36  320.53    0.53    6.85   91.48  193    7.00
SPEGELE A   323.00  517.19    6.02   6.02   6.84 414.66   1757.92   100.00  100.00   610.00   609.92  1757.92  323.00    0.00    6.86   91.69  188    7.00

STEWART D     0.00    3.47    3.47   3.47   3.47   3.47      0.00     0.00    0.00   396.50     0.00     0.00  320.00   320.00   3.47  100.00  111    5.00
STEWART D    40.00    5.01    5.01   5.01   5.01   5.01    186.39    12.69    0.00   403.01    54.78   186.39  225.00   185.00   4.98   97.19  58?    7.00
STEWART D    80.00    7.18    7.18   7.18   7.20   7.16    448.43    33.24    0.00   436.29   129.32   448.43  183.87   103.87   6.98   97.29  288    3.50
STEWART D   120.00    3.60    3.60   3.60   3.60   3.60    622.65    44.77    0.00   517.30   182.69   622.65  329.11   209.11   3.56  100.00  300    4.00
STEWART D   160.00    4.06    4.07   4.07   4.07   4.06    778.70    51.51    0.00   570.86   236.31   778.70  334.71   174.71   4.00   99.58  191    5.20
STEWART D   240.00    5.50    5.50   5.50   5.50   5.50   1193.19    75.35    0.00   607.91   400.12  1193.19  303.89    63.89   5.50   99.41  200    5.50
STEWART D   280.00    5.50    5.50   5.50   5.50   5.50   1413.16    89.87    0.00   609.91   538.98  1413.16  303.90    23.90   5.50   99.19  224    6.00
STEWART D   313.00 1639.85    5.89   5.89   5.94 1197.97   1606.76   100.00  100.00   610.00   609.91  1606.76  313.00    0.00    5.99   98.75  166    6.00

SUHADI B      0.00    3.47    3.47   3.47   3.47   3.47      0.00     0.00    0.00   396.50     0.00     0.00  320.00   320.00   3.47  100.00  354    3.50
SUHADI B     40.00    3.50    3.50   3.50   3.51   3.50    139.17     9.65    0.00   402.30    44.53   139.17  317.64   277.64   3.49   99.90  275    3.30
SUHADI B     80.00    3.33    3.34   3.33   3.34   3.33    273.00    21.66    0.00   423.26    84.74   273.00  345.27   265.27   3.30  100.00  159    4.40
SUHADI B    120.00    4.51    4.82   4.54   4.90   4.51    416.88    31.47    0.00   465.15   120.75   416.88  307.37   187.37   3.84   96.58  242    4.00
SUHADI B    160.00    4.09    4.16   4.10   4.17   4.09    572.14    39.61    0.00   526.23   179.41   572.14  264.54   204.54   3.92   99.39  138    5.00
SUHADI B    200.00    5.09    5.51   5.13   5.62   5.09    740.43    47.65    0.00   573.21   237.39   740.43  352.38   152.38   4.45   97.07  203    7.00
SUHADI B    240.00    7.12   10.24   7.29  12.45   6.92    965.62    58.33    0.00   598.79   311.36   965.62  327.58    87.58   5.69   94.55  166    6.00
SUHADI B    280.00    6.01    7.82   6.04   2.44   5.98   1176.60    72.71    0.00   608.11   404.89  1176.60  345.69    65.69   5.84   99.19  177    6.50
SUHADI B    320.00    6.58    5.90   6.86   5.95   6.49   1417.33    88.16    0.00   609.92   534.42  1417.33  343.46    23.46   6.16   98.70  187    6.50

SWANSON C     0.00    3.47    3.47   3.47   3.47   3.47      0.00     0.00    0.00   396.50     0.00     0.00  320.00   320.00   3.47  100.00   89    5.00
SWANSON C    40.00    5.00    5.00   5.01   5.01   5.00    186.39    12.70    0.00   402.59    48.29   186.39  224.91   184.91   4.98   79.43  297   13.00
SWANSON C    80.00   13.39   13.18  12.41  12.94   6.53    634.99    45.33    0.00   431.84   125.31   634.99  120.00    40.00  12.92   93.57  315   13.00
SWANSON C   120.00   18.47  131.57  12.08  12.21  13.00   1154.25    83.01    0.00   523.13   276.06  1154.25  128.67    8.67   13.00   71.6?  365   10.00
SWANSON C   160.00   10.73   11.02   9.36   9.52  10.06   1583.74    94.96    0.00   603.41   516.95  1583.74  190.19    30.19   10.05   97.07  268   10.00
SWANSON C   200.00   26.35    9.04   9.86   9.88  10.00   1984.22    97.93   72.68   610.00   609.89  1984.22  200.50    0.50   10.00   99.03  256    5.00
SWANSON C   205.00 1866.94    7.99   7.99   7.99   7.99   2029.29   100.00  100.00   610.00   609.97  2029.29  205.00    0.00    7.99  100.00  224    5.00

SWEENEY D     0.00    3.47    3.47   3.47   3.47   3.47      0.00     0.00    0.00   396.50     0.00     0.00  320.00   320.00   3.47  100.00  231    3.50
SWEENEY D    40.00    3.50    3.50   3.50   3.50   3.50    139.75     9.69    0.00   402.31    44.65   139.75  317.50   277.50   3.50   99.93  83?    4.00
SWEENEY D    80.00    4.55    4.55   4.55   4.55   4.55    310.84    23.79    0.00   424.00    94.19   310.84  266.45   186.45   4.49   97.96  841    4.10
SWEENEY D   120.00    4.21    4.21   4.21   4.22   4.21    478.67    35.54    0.00   479.02   146.88   478.67  313.64   193.64   4.11  100.00  ??     4.30
SWEENEY D   160.00    4.39    4.40   4.40   4.40   4.39    648.94    43.88    0.00   543.38   204.03   648.94  340.87   180.87   4.30   99.59  275    4.30
SWEENEY D   200.00    4.35    4.36   4.36   4.36   4.36    820.92    52.36    0.00   585.04   266.28   820.92  364.22   164.22   4.30   99.98  261    4.40
SWEENEY D   240.00    4.40    4.40   4.40   4.40   4.40    996.03    62.26    0.00   603.79   334.85   996.03  369.10   129.10   4.40   99.79  252    4.60
SWEENEY D   280.00    4.60    4.60   4.60   4.60   4.60   1178.24    73.96    0.00   609.12   412.65  1178.24  363.93    83.93   4.60   99.59  267   10.30
SWEENEY D   320.00   10.83    9.99   9.99  10.14   9.5?   1539.45    93.87   21.61   609.98   607.14  1539.45  322.70    2.70   10.24   94.90  149   10.30
SWEENEY D   327.00 3367.43   10.27  10.27  10.27   9.5?   1611.26   100.00  100.00   610.00   609.95  1611.26  326.98    0.00   10.27   96.96  148   10.30

SWETT B       0.00    3.47    3.47   3.47   3.47   3.47      0.00     0.00    0.00   396.50     0.00     0.00  320.00   320.00   3.47  100.00   74    3.75
SWETT B      40.00    3.75    3.80   3.76   3.81   3.??    141.85     9.81    0.00   402.33    45.07   141.85  298.24   258.24   3.61   99.08  227    3.75
SWETT B      80.00    3.79    3.83   3.79   3.84   3.79    287.68    22.40    0.00   423.77    88.96   287.68  309.88   229.88   3.68   99.51  217    3.75
SWETT B     120.00    3.84    3.88   3.84   3.89   3.84    435.54    32.72    0.00   471.08   135.35   435.54  339.23   219.23   3.71   99.75  517    3.90
SWETT B     160.00    3.98    4.05   3.99   4.07   3.98    586.04    40.23    0.00   532.79   185.23   586.04  370.57   210.57   3.80   99.40  224    4.50
SWETT B     200.00    4.57    4.80   4.59   4.86   4.57    745.66    47.81    0.00   576.95   240.90   745.66  370.89   170.89   4.14   97.97  195    4.50
SWETT B     240.00    4.52    4.66   4.53   4.72   4.52    915.22    56.93    0.00   599.97   304.36   915.22  385.10   145.10   4.32   98.95  236    5.00
SWETT B     280.00    5.02    5.66   5.06   6.01   4.99   1095.23    68.26    0.00   608.11   377.41  1095.23  374.74    94.74   4.65   98.21  220    5.00
SWETT B     320.00    5.55    2.48   5.65   3.74   5.45   1290.34    80.67    0.00   609.85   465.43  1290.34  370.56    50.56    5.06   97.94  289    5.50
SWETT B     360.00    5.59    5.19   6.29   5.20   5.53   1497.60    93.98    3.50   610.00   597.78  1497.60  373.09    13.29   5.28   98.95  167    5.50

THERRIAU A    0.00    3.47    3.47   3.47   3.47   3.47      0.00     0.00    0.00   396.50     0.00     0.00  320.00   320.00   3.47  100.00  135    3.50
THERRIAU A   40.00    3.50    3.50   3.50   3.51   3.50    139.17     9.65    0.00   402.30    44.49   139.17  317.64   277.64   3.49   99.79  194    3.50
THERRIAU A   80.00    3.53    3.55   3.55   3.57   3.53    278.75    21.79    0.00   423.38    86.53   278.75  328.55   248.55   3.49   99.66  206    7.00
THERRIAU A  120.00    7.24    9.60   9.60  23.27   5.02    456.04    33.64    0.00   468.19   133.96   456.04  231.98   111.98   6.58   74.63  274    5.50
THERRIAU A  160.00    5.63    5.86   5.86   0.50   5.48    667.37    45.53    0.00   531.64   190.50   667.37  291.71   131.71   5.35   92.98  304    5.50
THERRIAU A  200.00    4.56    4.60   4.60   4.84   4.55    855.72    55.76    0.00   578.34   254.34   855.72  341.80   141.80   4.51  100.00  31?    5.50
THERRIAU A  240.00    5.55    6.69   6.69   3.37   5.44   1046.84    66.33    0.00   601.53   327.54  1046.84  329.33    89.33   5.00   92.61  243    5.50
THERRIAU A  280.00    5.53    3.21   3.21   5.02   5.47   1252.05    79.50    0.00   608.75   417.01  1252.05  332.62    52.62   5.24   94.99  399    8.50
THERRIAU A  320.00    9.61    5.87   5.87   6.42   9.06   1496.63    89.83    0.00   609.98   574.09  1496.63  335.37    15.37   6.83   78.48  157    8.50
THERRIAU A  355.00 3061.03    7.57   7.57   7.57 2450.34   1749.75   100.00  100.00   610.00   609.87  1749.75  354.97    0.00    7.57   98.72  33?    8.50

TILLERY B     0.00    3.47    3.47   3.47   3.47   3.47      0.00     0.00    0.00   396.50     0.00     0.00  320.00   320.00   3.47  100.00  124    4.50
TILLERY B    40.00    4.51    4.72   4.54   4.77   4.51    149.89    10.28    0.00   402.42    46.72   149.89  252.96   212.96   3.97   96.90  262    5.40
TILLERY B    80.00    7.76    6.63   8.16   6.53    334.84    25.40    0.00   425.43   100.28   334.84  206.99   126.99   5.16   94.29  329    9.40
TILLERY B   120.00    8.77   13.78   9.02  17.90   8.38    575.90    40.94    0.00   490.15   173.14   575.90  204.39    84.39   6.74   14.10  344    9.40
TILLERY B   160.00    6.69   15.61   8.86  97.73   8.13    861.28    56.02    0.00   562.79   270.42   861.28  229.68    69.88   7.55   17.19  397    9.20
TILLERY B   200.00    9.96    6.44   9.81   7.00   8.44   1182.95    73.51    0.00   604.44   393.99  1182.95  237.99    37.99   8.35   97.55  224    9.00
TILLERY B   240.00    9.73    8.60   7.91   8.61   8.67   1524.06    94.30   15.79   609.79   605.84  1524.06  243.76    3.76   8.67   99.03  ??     ?.00
TILLERY B   249.00   29.98    8.32   7.94   8.33   8.39   1600.69    97.57   90.02   609.97   609.90  1600.69  249.18    0.18    8.39  100.00  297    8.??
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TSONGAS A	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00
TSONGAS A	40.00	5.02	5.39	5.39	6.39	4.97	155.25	10.59	0.00	402.36	45.66	155.25	
TSONGAS A	80.00	4.55	4.64	4.64	4.92	4.53	326.98	25.33	0.00	424.17	91.56	326.98	
TSONGAS A	120.00	4.40	4.46	4.46	4.62	4.39	499.52	37.63	0.00	475.12	141.66	499.52	
TSONGAS A	160.00	4.08	4.12	4.12	4.23	4.06	662.48	45.80	0.00	538.71	195.55	662.48	
TSONGAS A	200.00	3.24	3.25	3.25	3.27	3.24	798.39	52.52	0.00	581.06	243.30	798.39	
TSONGAS A	240.00	2.80	2.80	2.80	2.79	2.80	914.46	59.10	0.00	600.98	287.52	914.46	
TSONGAS A	280.00	3.41	3.63	3.63	4.61	3.33	1033.09	66.80	0.00	607.95	338.12	1033.09	
TSONGAS A	320.00	4.03	4.97	4.97	1.98	3.93	1166.62	75.41	0.00	609.69	394.27	1166.62	
TSONGAS A	360.00	4.64	8.34	8.34	2.35	4.46	1313.07	82.05	0.00	609.98	480.02	1313.07	
TSONGAS A	400.00	4.25	0.50	0.50	3.74	4.20	1468.27	85.71	0.00	610.00	536.88	1468.27	
TSONGAS A	440.00	4.23	4.02	4.02	4.06	4.20	1629.71	94.95	6.42	610.00	599.65	1629.71	
TSONGAS A	466.00	21.73	4.10	4.10	4.11	10.21	1736.48	100.00	100.00	610.00	609.85	1736.48	
TUTT A	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00
TUTT A	40.00	4.01	4.10	4.10	4.20	4.01	144.53	9.96	0.00	402.32	44.85	144.53	281.26
TUTT A	80.00	4.04	4.11	4.11	4.28	4.34	296.61	23.06	0.00	423.63	88.24	296.61	292.96
TUTT A	120.00	4.09	4.16	4.16	4.34	4.09	452.55	34.06	0.00	470.18	134.61	452.55	320.01
TUTT A	160.00	6.70	8.33	8.33	37.19	5.68	637.26	43.44	0.00	532.31	187.80	637.26	275.85
TUTT A	200.00	6.63	7.90	7.90	2.27	6.12	858.72	55.00	0.00	577.87	251.94	858.72	297.87
TUTT A	240.00	4.52	4.51	4.51	4.57	4.52	1051.75	66.64	0.00	601.25	324.82	1051.75	349.77
TUTT A	280.00	4.50	4.50	4.50	4.50	4.50	1231.97	78.37	0.00	608.66	410.11	1231.97	350.19
TUTT A	320.00	5.12	3.58	3.58	4.24	5.00	1411.97	88.70	0.00	609.95	541.36	1411.97	355.73
TUTT A	360.00	7.02	4.28	4.28	4.40	6.51	1591.96	98.01	36.76	610.00	608.43	1591.96	164.80
TUTT A	388.30	5.73	2.59	2.59	2.60	5.11	1680.03	99.84	94.03	610.00	609.90	1680.03	388.53
VANNEDER C	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00
VANNEDER C	40.00	3.50	3.50	3.50	3.50	3.50	139.75	9.69	0.00	402.30	44.52	139.75	317.50
VANNEDER C	80.00	4.04	4.04	4.06	4.06	4.04	295.29	22.94	0.00	423.51	87.96	295.29	293.36
VANNEDER C	120.00	5.12	5.13	5.20	5.22	5.12	486.34	36.03	0.00	470.75	137.86	486.34	273.10
VANNEDER C	240.00	8.61	8.68	8.43	8.44	8.49	1334.79	83.97	0.00	604.16	405.20	1334.79	262.34
VANNEDER C	280.00	9.21	8.66	8.97	8.98	9.02	1690.28	94.31	18.38	609.96	606.05	1690.28	265.44
VANNEDER C	298.00	487.53	8.63	8.94	8.95	188.75	1852.24	100.00	100.00	610.00	609.93	1852.24	298.01
WALSH C	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00
WALSH C	40.00	5.20	5.20	5.21	5.21	5.20	192.61	13.10	0.00	402.64	48.87	192.61	216.61
WALSH C	80.00	5.26	5.27	5.31	5.32	5.26	400.45	30.96	0.00	426.57	100.86	400.45	225.10
WALSH C	120.00	3.69	3.69	3.72	3.72	3.69	560.18	42.34	0.00	486.20	149.01	560.18	319.08
WALSH C	160.00	4.18	4.18	4.22	4.24	4.18	719.96	49.89	0.00	546.19	199.67	719.96	326.94
WALSH C	200.00	4.65	4.66	4.71	4.72	4.65	899.46	59.18	0.00	584.89	257.67	899.46	326.75
WALSH C	240.00	4.60	4.60	4.61	4.61	4.60	1083.41	70.24	0.00	603.29	327.21	1083.41	333.09
WALSH C	280.00	4.60	4.60	4.60	4.60	4.60	1267.41	82.61	0.00	609.00	421.92	1267.41	333.14
WALSH C	320.00	4.69	4.71	4.34	4.43	4.67	1451.40	87.59	0.00	609.98	548.09	1451.40	364.59
WALSH C	360.00	11.93	4.31	5.96	5.99	10.78	1685.15	98.18	48.76	610.00	608.92	1685.15	362.21
WALSH C	374.00	2523.19	4.67	4.67	4.67	2019.49	1759.07	99.44	94.93	610.00	609.88	1759.07	373.94
WALTERS C	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00
WALTERS C	40.00	3.80	3.80	3.80	3.80	3.80	149.08	10.29	0.00	402.35	45.12	149.08	293.12
WALTERS C	80.00	3.84	3.84	3.85	3.85	3.84	301.05	23.68	0.00	423.78	88.81	301.05	303.31
WALTERS C	120.00	3.89	3.89	3.92	3.93	3.89	453.04	34.16	0.30	470.90	135.16	453.04	330.93
WALTERS C	160.00	5.52	5.53	5.62	5.65	5.52	654.79	44.43	0.00	533.27	190.28	654.79	297.72
WALTERS C	200.00	5.48	5.48	5.56	5.59	5.47	870.64	56.03	0.00	578.86	255.24	870.64	316.22
WALTERS C	240.00	5.93	5.94	6.07	6.35	5.92	1102.19	69.23	0.00	601.81	335.01	1102.19	314.84
WALTERS C	280.00	5.90	5.90	5.90	5.90	5.90	1338.14	84.53	0.00	608.94	447.85	1338.14	315.33
WALTERS C	320.00	5.71	2.09	5.93	5.93	5.71	1574.13	95.09	17.69	610.00	605.82	1574.13	329.46
WALTERS C	345.00	66.83	5.36	5.58	5.59	54.59	1716.90	100.00	100.00	610.00	609.93	1716.90	345.04
WEATHERF B	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00
WEATHERF B	40.00	3.50	3.50	3.50	3.51	3.50	139.17	9.65	0.00	402.30	44.53	139.17	317.64
WEATHERF B	80.00	3.53	3.55	3.53	3.55	3.53	278.75	21.78	0.00	423.41	86.70	278.75	328.58
WHITTEN D	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00
WHITTEN D	40.00	3.50	3.50	3.50	3.50	3.50	139.75	9.69	0.00	402.31	44.65	139.75	317.50
WHITTEN D	80.00	6.08	6.08	6.08	6.09	6.08	357.48	26.67	0.00	425.28	104.92	357.48	212.30
WHITTEN D	120.00	4.63	4.64	4.64	4.65	4.63	551.97	40.35	0.00	493.15	165.67	551.97	285.92
WHITTEN D	160.00	4.59	4.60	4.60	4.60	4.59	732.21	48.96	0.00	557.65	228.06	732.21	319.25
WHITTEN D	200.00	6.07	6.06	6.08	6.09	6.07	958.85	60.33	0.00	593.72	308.76	958.85	295.40
WHITTEN D	240.00	7.00	7.01	7.01	7.01	7.00	1229.80	76.34	0.00	607.33	417.78	1229.80	286.35
WHITTEN D	280.00	5.99	5.93	5.93	6.08	5.99	1479.53	93.27	0.00	609.95	587.89	1479.53	292.50
WHITTEN D	320.00	2.26	1.89	1.89	1.08	2.12	1583.95	99.72	68.05	610.00	609.70	1583.95	327.51
WIEDENHO A	0.00	3.47	3.47	3.47	3.47	3.47	0.00	0.00	0.00	396.50	0.00	0.00	320.00
WIEDENHO A	40.00	10.21	17.69	17.69	3.29	7.13	208.85	13.73	0.00	402.65	50.60	208.85	128.45
WIEDENHO A	80.00	10.31	42.77	42.77	5.99	8.39	510.98	38.25	0.00	429.78	113.49	510.98	143.74
WIEDENHO A	120.00	10.49	6.07	6.07	8.40	9.12	860.86	62.22	0.00	506.52	197.36	860.86	161.45
WIEDENHO A	160.00	5.13	4.42	4.42	5.02	5.07	1101.41	78.53	0.00	575.25	292.50	1101.41	210.70
WIEDENHO A	200.00	2.35	2.47	2.47	2.77	2.34	1211.59	82.94	0.00	603.44	365.28	1211.59	405.65
WIEDENHO A	240.00	5.24	6.95	6.95	116.68	4.89	1325.23	82.94	0.00	609.27	402.51	1325.23	361.89
WIEDENHO A	280.00	5.04	6.04	6.04	3.78	4.88	1481.01	82.94	0.00	609.96	446.39	1481.01	388.91
WIEDENHO A	320.00	5.03	6.86	6.86	3.92	4.94	1658.36	82.94	0.00	610.00	501.34	1658.36	293.94
WIEDENHO A	360.00	5.03	4.44	4.44	4.70	4.98	1846.77	90.14	0.00	610.00	566.29	1846.77	196.46
WIEDENHO A	400.00	10.36	4.81	4.81	4.85	9.27	2040.82	99.21	76.23	610.00	609.66	2040.82	400.90
WIEDENHO A	40?.00	41.55	4.87	4.87	4.89	34.22	2055.52	100.00	100.00	610.00	609.85	2055.52	403.25

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